Intellectual Property Protection for Computer Software: A Comparative Analysis of the United States and Japanese Intellectual Property Regimes

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Abstract

This thesis explores the reform of intellectual property regulation policies with respect to computer software within two advanced industrial nations after 1980. A comparative case analysis of the United States and Japan will provide insight as to how advanced industrial nations have responded to market forces, competing private interests, and international pressure for policy harmonization in the construction and implementation of intellectual property regulation reforms. This study will show that ideological and structural arrangements of state institutions have influenced the extent of liberalization in intellectual property policy, and the preservation of equilibrium between individual rights and public interests in the establishment of intellectual property.

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Abbreviations

CAFC	Court of Appeals for the Federal Circuit
DMCA	Digital Millennium Copyright Act
DOJ	Department of Justice
IP	Intellectual property
IPR	Intellectual property rights
JCO	Japanese Copyright Office
JPO	Japanese Patent Office
METI	Ministry of Economy, Trade and Industry
MITI	Ministry of International Trade and Industry
MOE	Ministry of Education (*monbusho*)
MEXT	Ministry of Education, Culture, Sports, Science, and Technology
OS	Operating System
OTA	Office of Technology Assessment
PTO	Patent and Trademark Office (United States)
SOFTIC	Software Information Center
TRIPS	Trade Related Aspects of Intellectual Property agreement
USPTO	United States Patent and Trademark Office
USSC	United State Supreme Court
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Chapter One

For over a century, in order to promote economic development and wealth creation, nations have recognized ideas, creative works, and designs as private objects of exchange under intellectual property (IP) law. This temporary assignment of ownership over intellectual works met the need for finding balance between private interests in wealth accumulation and the public interest. Intellectual property regimes forced to adjust their regulatory policies as national economies increasingly focus on knowledge commodities. Different nations, however, have implemented IP reforms that reflect their beliefs on where this balance lies and how it should be maintained.

During the 1950s, the early days of the computer industry, software was perceived as an incidental, yet necessary, byproduct of industrial manufacture. Software, a collection of computer data and instructions for computers, was custom written for specific hardware platforms to operate as an intermediary between people and machines. This model of software development and integration with hardware was maintainable due to the low diffusion and availability of computers in the mass market. Additionally, large software packages could not be developed due to physical limitation of space on available storage media. Over the course of the past two decades, the available storage capacity of computer media has exploded. This has created an environment where large software projects can be produced using new programming languages, new techniques and reusing previously existing code.

The emergence of commercially available operating systems and application software, from companies such as Microsoft, Apple and others, created a division between computer hardware and software. Software's separation from the physical

hardware transformed it into an individual object of exchange, to be packaged and sold to the mass market. The broad diffusion of computers into almost all industries has contributed to the emergence of an informational economy that employs knowledge and ideas as foundational capital, an economy in which software plays a pivotal role.

Once separated from computer hardware, software became subdivided into two categories: system software, and application software. System software, also called the operating system (OS), provides a direct interface with the hardware. However, this interface can be unwieldy to use for the average computer user. Application software (AS), on the other hand, creates an environment with which end user can interact to perform some useful task. The application software communicates this to the OS, which operates the hardware, rather than dealing with it directly.

In order to maximize software's full economic potential, governments have established guidelines of IP ownership. Asserting ownership over software in general and packaged software in particular, has proven to be a complicated quandary for regulatory authorities of advanced industrial nations. Software is described as possessing a "hybrid nature", a combination of characteristics that grants software nonexclusive protection under laws for trade secrets, copyrights and patents. Now considered the "*crown jewels of the information economy*," a power struggle has been waged, both nationally and internationally, over the ownership and protection of computer software in intellectual property policy. (Branscomb 1990, 47) Taking advantage of its "hybrid nature," states have implemented reforms to intellectual property policies that extend stronger legal mechanisms of ownership over computer software to maximize it potential for capital generation. (Branscomb 1990, 53)

Topic and purpose of the study

Despite influences from international treaties towards a standard global IP policy, US and Japan IP reforms, with respect to computer software, display significant variations from each other. The purpose of this thesis is to explore the variations in development of ownership protections for packaged software under the intellectual property regimes in those two advanced industrial nations.

While discourse over the "right" to IP ownership and economic arguments have generally been used to justify the extension of ownership to innovators and creators over intellectual property, these concerns are balanced against public interests and social concerns by government regulators. The maintenance of this balance emerged as a recurring theme as states have implemented reforms that extend the intellectual property protection over computer software. These reforms are largely shaped by how state actors perceive their roles as regulators, where the balance between public and private interests lies and how it should be maintained.

International standards for IP have been developed for over a century, initially with the 1889 Paris Convention and 1886 Berne Convention, through the recent 1994 Trade Related Aspects of Intellectual Property Rights Agreement (TRIPS). International organizations such as the World Intellectual Property Organization (WIPO) and World Trade Organization (WTO), have exerted normative influences on IP policy reforms throughout the world. International treaties and organizations have imparted a normative influence on national IP reforms, bringing nations closer towards a common international standard of IP protection. Throughout this process of international policy harmonization, the strength and focus of reforms have varied across regimes.

These regimes are national approaches towards the regulation of IP within the state. Reforms within each IP regime has been shaped by the different perspectives held by state actors as to how software should be owned, the economics of knowledge, what specific private and public interests are invested in its ownership, where the balance between private and public interests lies, and the proper mechanism by which the state can maintain it.

While both Japan and the United States have all followed the normative trend of international harmonization in granting a broader range of liberal protections for software as intellectual property, these reforms have maintained a balance with public interests through mechanisms that reflect each IP regime's past history of industrialization. The characteristics of the regime are manifested through sectoral actor's ideals and preferences. Legal provisions authorizing "fair use" of protected material, different requirements for copyright registration, criteria for patentability, as well as government interventions in disputes, have all been utilized as mechanisms of maintaining regimes preferences while meeting international obligations. The differing degrees of protection for both private and public interests among intellectual property regimes reflect the embedded ideologies and goals held by state institutions within those regimes.

Potential significance of the study

Nations desiring to trade with Japan or the United States, as well as those wishing to join the European Union, soon will be faced with the prospect of developing policy infrastructures for informational economies. Obligations under international treaties, such as TRIPS, apply pressure on nations to establish minimum protections for intellectual property. While the extension of intellectual property protection in the computer software

industry can provide an attractive avenue for rapid economic development, legislators and regulators must be cognizant of the controversial issues involved when constructing policy reforms. Understanding the ideological and institutional predispositions involved in property regulation of software will aid the development of policies that encourage the development of an informational economy, while remaining congruent with a system of international laws and obligations that favor advanced industrial nations.

The study of computer software as intellectual property provides a wealth of interesting and important research topics. Currently the subject of international debate is the establishment of patent protections for computer software and business methods. Differing perspectives on the role that patents play in a knowledge economy are the cause of heated debate between national representatives. Additionally, policy concerns held by state actors in this study can be applied to new technologies and spheres of knowledge (such as human genetics), allowing insight on the challenges posed and policy options available to intellectual property regimes in advanced industrial nations. Legislators, regulators and courts will all have to reevaluate knowledge-based economic models and revisit the issue of balance between private rights and public interests in the designation of ownership of those intellectual assets. Lessons learned in this study as to how ideas and structures of state institutions have affected intellectual property policy reregulation can be used in future efforts of reform, and they may give businesses involved with cutting edge research an indication of emerging political and legal landscapes concerning knowledge production and ownership.

Framework and research questions

The overall research questions that guide this research are as follows:

- How have advanced industrial nations reformed intellectual property regulations to increase the capital potential of computer software?
- How have the boundaries demarcating private and public rights been maintained within IP regimes with respect to computer software?
- What internal and external factors most significantly affect the range of choices available to state institutions in reforming policy?

In order to explore and analyze variance in intellectual property regimes policies, a qualitative model is required in order to incorporate ideas concerning the balance between private incentives and public interests among the intellectual property regimes of the United States and Japan. In Freer Markets, More Rules, one such explanatory framework is proposed. Focusing on regulatory reform of the telecommunication and financial services industries in the United Kingdom and Japan, Steven Vogel proposes a framework for comparative case analysis. This framework focuses on policy reforms through state actors, where their ideologies and structural arrangements are the determining factors, rather than market and private interests, in shaping policy reforms. Collectively, these ideas and structures within a nation constitute a regulatory regime. By analyzing the organization and orientation of sectors, a composite profile of the national regimes can be inferred. (Vogel 1996, 22)

Examining telecommunication and financial sectors in Japan and the United Kingdom, Vogel illustrates three perspectives for understanding reform: market driven deregulation, interest-driven deregulation and government reregulation. While market and interest-driven frameworks seem appropriate for comparative case analysis of

intellectual property regimes, the author contends that since 1975, reforms are not actually "*deregulation but a combination of liberalization and reregulation.*" To further evaluate reforms have upon ability of state institutions to retain control over industry, Vogel constructs a typology of four primary forms of regulatory reform that varies according to the emphasis of reforms (either reregulation or liberalization) and the effect that those reforms have on government control over industry. (Vogel 1996, 16-17)

This framework of understanding reregulation focuses on state actors, instead of markets and international interests, as the primary influence that shapes policy. This creates a simplified model that is parsimonious and allows for comparative analysis of regimes. The state is considered both an actor and a structure, requiring the identification of the "*ideas that inform it as an actor and the institutions that define it as a structure.*" These ideas constitute a regime's orientation, defined as the "*state actor's beliefs about the proper scope, goals and methods of government intervention into the economy, and how this intervention affects economic performance.*" (Vogel 1996, 20) The institutional arrangement of state actors, mechanisms of economic regulation and policy creation procedure constitute a regime's organization. Determining a regime's orientation is especially important because it "*defines what is possible and acceptable in the range of policy choices available*" and affects the reactions to external influences, such as pressure from other nations and obligations to international organizations and treaties. (Vogel 1996, 21)

Table 1: States as actors and structures

Regulatory regime	
Organization (structures) • Institutions • Arrangements with other actors • Relationships with industry and the private sector.	Orientation (ideas) • Scope • Goals • Methods of economic intervention • Perceived social and economic effects of government intervention

(Vogel 1996, 20-21)

This framework is further enhanced through the employment of sectoral and historical analysis. Orientations of sectors are expected to exhibit only minimal variances within a regime and thus reflect national regime orientations. By examining the sectors within a regime, a more nuanced and comprehensive orientation can be constructed. Incrementally evolving over time, the orientation of a "*regulatory regime reflects its history of industrialization.*" (Vogel 1996, 23) This orientation offers both historical and sectoral analysis as mechanisms for facilitating regime analysis and comparison.

Adopting Vogel's framework, that places state actors at the center of policy reforms, allows the stated research questions to be pursued. The evaluation of the effects that regime orientations have on policy reforms through historical and sectoral analysis enables regime comparisons for similarities and differences in reforms. Vogel's model is augmented by examining the cultural and political basis of the "right" to intellectual property ownership within each regime. This examination of rights under each regime allows a more complete understanding of national policy variations.

Limitations and assumptions

The analytic framework utilized in this study is intended to explore the importance of state actors in determining the scope, direction and extent of IP regulatory reform with

respect to the ownership of computer software. This is primarily due to the inherent role the nation-state plays in the designation of property ownership, both physical and intellectual, and the rights to ownership entitled to creators of intellectual property. While non-governmental entities may be given some authority in the regulation of IP, that authority ultimately originates with the state.. While state actors, rather than individuals, play the most significant roles in shaping regulatory reforms, it is possible that market crashes, scandals, war or some other great historical event can temporarily supplant the importance that state actor ideology and institutional arrangements have in shaping reforms. Furthermore, Vogel's analytic framework assumes that market and economic interests' influence upon policy reform among advanced industrial nations are approximately equal, offering only a limited analysis of their influence upon intellectual property policy reform. Additionally, there are a number of informal relationships that exist in prevailing political landscapes (such as lobbying, conflicting interests of government officials, etc…) that are outside the analytic scope of this study.

What constitutes appropriate protection for that ownership has been debated since the early days of the computer industry. While the central focus of a majority of the debates have centered on the economic impact that trade secret, copyright and patent protection for software would have, there has been no general consensus among experts in economic circles on the effects that stronger IP regulation has had on the software industry. (OTA 1992, 183) While speculation about the economic and social impacts of IP policy reform is the subject of debate, the general area of inquiry lays outside the scope of this particular investigation. As such, this study will not prescribe or make qualitative judgments concerning the proper scope of property protection for computer

software for either industrialized or developing nations. Rather than attempt to critique existing intellectual property policies, proposed reforms, or prescribe alternative economic models for intellectual property protection of computer software, this study will focus on the beliefs held by state actors and the impact of institutions on policy reform.

Literature Review

While classical political theory has significantly shaped current understanding of the ownership of intellectual creations, a good deal of recent discussions has also focused on the economic and institutional aspects of intellectual property reforms. During the past two decades, experts from a variety of fields have prescribed policy reforms. Lawyers, economists, academics, businessmen and computer enthusiasts have all expressed their opinions concerning the effect intellectual property reforms would have on the computer industry. Some have provided descriptive historical chronologies of courts battles, while others make explanatory investigations about why reforms have occurred.

Political Theory

John Locke, Kant and Marx have contributed theories and models for understanding the political issues that are central to intellectual property policies. Locke's contention on the naturally derived right for individuals to own the products of their labor is central to the push for liberal reforms. Kant poses the problem the state faces when regulating these Lockean rights. The state is burdened with enacting laws to perpetually maintain a balance between the individual and public liberties, while reconciling those laws with international standards. Finally, Marx's critique of capital provides a basis for

understanding the effects stronger laws for ownership of software as intellectual property have economically and politically. Their theories serve to frame the discussion of rights and balance in property ownership used throughout this thesis, and are examined in greater detail in chapter two.

Economic Implications

A great deal of economic research has concerned itself with the relationship between intellectual property and the economy. However, while nations have readily accepted the need to legally recognize software as intellectual property, there is considerable debate concerning the balance of private rights with the public interests.

Janusz Ordover, a professor of economics at New York University, has analyzed the relationship patent regimes strength and the economic balance between private incentives for R&D investment and the public diffusion of knowledge. Providing a comparative analysis of intellectual property rights and antitrust regimes among the United States, Japan and European Community, Ordover contends that liberal patent policy reforms are not a necessary condition for economic growth and returns on R&D investments to property holders. He does contend, however, that extremely weak intellectual property protections are economically inhibiting. (Ordover 1991, 43-60)

Claire Polster expresses similar concerns that the reforms of intellectual property laws are exhibiting some undesirable social and economic effects, and proposes a reexamination of production and consumption mechanisms of knowledge/information economies. (Polster 2001, 85) Unintended market practices, such as predatory litigation, raised barriers to market entry and patent cross licensing the have developed in response to the commodification of knowledge undermine the original intent of IP regimes by

introducing chilling effects on research, publication and distribution of knowledge for the benefit of society. These studies underscore the necessity of developing an alternative theoretical framework to the traditional economic model that can explain variations in intellectual property policy.

Institutional Explanations

Some authors have examined how and why copyright and patent protections have been extended to software through litigation. IBM's Assistant General Counsel and a leading high technology lawyer of the 1990s, Anthony Claves chronicles these battles in his book, Softwars. Claves contends that the shape of modern intellectual property protection for computer software has been primarily influenced through the courts. Another book, The Patent Wars, by Fred Warshofsky, follows a similar line of reasoning, but focuses instead on the international battle for high technology patents, including software. These works provide rich legal histories, yet over-emphasize the significance a single institution, the courts, has in shaping intellectual property policy for computer software. Neglecting the impact that legislative and regulatory actors play in policy reforms, these authors have contributed to the contention that courts have prompted regulatory reform of intellectual property protection for computer software. However, a model of juridical centered policy reforms fails to explain variations in policy strengths between US and Japanese intellectual property regimes.

Academic collaborations explore the implications of international harmonization of intellectual property rights. Rushing and Brown have published a compilation of presentations from economists and political scientists at a 1989 research symposium on intellectual property rights that offers a wide range of analyses concerning property

regimes and state perspectives on how computer software should be recognized. Presentations included descriptive research on the national and international struggles for property ownership over computer software, as well as Japanese and European perspectives on the protection of computer software and the economic integration into a global informational economy.

A comparative study by Katobe on US and Japanese patent systems indicates that there are significant differences not only in attitudes towards intellectual property, but also in the policies of IP recognition and protection. The United States regards patents as property, choosing to place heavier import on the rights of individuals. Japan, on the other hand, has chosen to implement a regime that regards IP more as a public good. These institutional perspectives explain the differences between national patent policies, including application publication policies, eligibility for patent rights and the compulsory licensing policies that are absent in the U.S. This piece supports the idea that different cultures of "rights" has manifested in variations in the focus of IP regulation between the US and Japan.

Searching for an explanation to differences in IP regimes, some economists have attributed these variances to the role that legislative bodies play in decision making during the policy construction process. Peter Moser, one such economist, used spatial modeling analysis to provide compelling evidence that the structural arrangements of legislative institutions have a great deal of impact on the policy selection. (Moser 1999, 1-33) However, regulatory agencies and the courts can have different interpretations of those policies than the original intent held by legislative bodies. The influence that policy

interpretation by non-legislative entities imparts on a national regime makes this framework of analysis concerning intellectual property reform incomplete.

The problems for IP protection posed by software's "hybrid nature" have forced a reexamination of the fundamental political ideals and beliefs intrinsic to each mechanism and IP in general. Economic explanations of policy reform do not adequately explain national variances, while institutional literature has overstated the influence that courts, particularly the American courts, have exerted on intellectual property protection for computer software. The issues of private rights, the public interest and balance between the two explored by classical theorists in property ownership, such as Locke and Kant, have reemerged as critical elements in reform of modern intellectual property regimes, especially when concerning computer software. Using Vogel's analytic model for policy reform, classical ideas and the importance of state institutions in policy selection can be incorporated to explore regime variances in intellectual property protection for computer software.

Methodology

Overall approach and rationale

Vogel's conceptual framework of reregulation is utilized as a model for systematically examining regulatory reforms within an intellectual property regime. A comparative case study of intellectual property regimes in the United States and Japan is necessary to explore the national differences in protections afforded to computer software and how they came about. The structured, focused, and systematic qualitative analytic model used here enables comparative analysis of intellectual property regimes of the

investigated advanced industrial nations. (King, Keohane and Verba 1994, 45) The case study approach, using a systematic framework of analysis, allows comparisons across intellectual property regimes. This approach further enhances the ability of sectoral comparisons to contribute a nuanced understanding of their respective regime orientation. Applying Vogel's framework, the three sectors of IP protection for software in each country (trade secret, copyright and patents) are examined. In order to construct a more complete profile of the national IP regime, the history of the "rights" to intellectual property ownership is examined as well.

Intellectual property regimes within advanced industrial countries have developed a number of distinct mechanisms that apply to computer software that can be considered sectors: trade secrets, copyrights and patents. Analysis of each of these sectors will further contribute to the composition of a nuanced profile of each regime's orientation, as well as highlight similarities and differences among regimes. For each type of property protection mechanism, these actors and structures need to be identified. This will be done by examining the relevant laws and regulations that define institutional relationships between actors. The historical development of intellectual property with each regime, further augmented by sectoral examination of policy reforms to account for computer software, will contribute significantly to comparative analysis. The construction of regime orientations will be further nuanced by examining where the focus of debate on intellectual property lies, on the economic aspects, or on the inherent right of the innovator/creator to benefit. The policy reforms implemented within each regime will be evaluated for their focus on individual versus public interests, as well as the effect that it has on the regulatory ability the government holds over the economy.

Case selection

While international treaties have promoted a normative effect on intellectual property policy harmonization, there are still significant differences among regime reforms. The nature of the emerging global informational economy requires a focused discussion of challenges facing national intellectual property rights regimes. These two regions merit investigation and comparison due to their high levels of economic and political investment in recognizing computer software as intellectual property. During 1996, the global revenue generated by packaged software was estimated at $109.3 billion. With American companies accounting for roughly 46.2% and Japanese companies 11.4% of the world's packaged software, the US and Japan together maintain dominant positions as producers of packaged software. (OECD 1998, 9) Further displaying the dominant presence of the United States in the computer software industry, US companies comprise four of the top five corporate software producers. (OECD 1998, 20) The dominance that US and Japanese companies have in the global computer software market, both in terms of production and consumption, magnify the international impact that national IP reforms yields. These reforms have, and will continue to, affect how other IP regimes, such as in the EU, China and India, reform their IP laws to protect computer software.

Each region holds a different predisposition as to where the boundaries between private and public rights are and how they should be maintained. While each regime has sought to maintain internal equilibrium, the interrelationships forged during the development of information economies during the past two decades now imposes significant pressure upon nations to maintain uniform intellectual property policies. A comparative analysis of regulatory reform in U.S. and Japanese intellectual property

regimes regarding computer software will provide insight as to how other nations are likely implement policy reforms to develop informational economies. Identifying the significant beliefs and goals that influence these variations will offer insight for policymakers, regulatory agencies, and other interested parties who wish to affect future reforms in their own countries.

Data gathering methods

In this study, historical documents will be used as the primary source for data. The advantage to this methodology of data collection is that it is unobtrusive to the field of research. Unfortunately, it also decreases the span of inferential reasoning that this study offers. (Marshall and Rossman 1999, 117)

I have used the following research methods in this study:

- Official websites, reports and publications from relevant state actors within each sector help identify their fundamental goals and regulatory preferences within each regime.
- The works of other researchers describing the extension of intellectual property rights to software through regime policy reforms identify common themes and systemic differences between regimes.
- Literature examining the role of state actors within sectors of their respective regime aid in the construction of sectoral and regime profiles.
- News media, journals and other industry literature concerning intellectual property reforms and the protection of computer software provide assessments and discourse on how the balance of private and public rights are affected by reforms.

Data analysis procedures

In order to make sure that each case study offers significant insight as to how variations of policy reform have occurred, the relevant state actors will be compared in historical context through their interrelationship and ideas that influence their orientation. Of particular interest is determining the degree of a regime's liberal perspective, social protection, and preference for instituting state intervention to maintain equilibrium of private and public interests. Responses to pressures for regulatory reform, as well as limitations exerted by international obligations on the reform options available to actors, will be identified.

Chapter Two provides a common historical and theoretical background concerning property ownership, intellectual property law, how it relates to computer software, and the normative influences exerted from the international community. Classical political theory of property ownership, specifically Locke, is discussed in order to elaborate on their influence on these issues of property ownership and its relationship with Kant's balance between public and private interests. A survey of literature concerning the social and economic roles that intellectual property, with specific examinations comparing and contrasting the three relevant mechanisms (trade secrets, copyrights and patents) is made. A chronology of relevant international treaties and organization, accompanied by brief descriptions, will help place regime reforms in an international context and control for normative influence on policy decisions.

Chapters Three and Four are case studies of reforms in the intellectual property regimes in the United States and Japan, respectively. I argue that the history of "rights", as applied to IP, as well as the historical development of each nation's computer software

industry has shaped the IP reforms to protect computer software. Each case begins with an introduction to the national intellectual property regime and a survey of the political and social factors that shape national IP policy. Next, the development of reforms to protect computer software within each IP sector is profiled conducted. Finally, these sectoral analyses are combined to construct a regime profile. Chapter Five provides a comparative analysis of sectoral and national IP regimes between the US and Japan. The cultural and political perspectives on the "right" to IP ownership, coupled with the differing historical development of each country's computer software industry, have affected IP reforms to protect computer software.

Chapter Two: Intellectual Property Theory and Computer Software

Inquiry into reforms of intellectual property regimes, with respect to computer software in particular, requires an exploration of the political theories, regulatory mechanisms and international environment that the US and Japanese IP regimes have developed under. The primary purpose of this chapter is to provide a common background and context for exploring and comparing US and Japanese IP reforms. Locke, Kant and Marx's political theories are explored in the context of intellectual property. The mechanisms of trade secrets, copyrights and patents are examined, followed by a brief history of the computer software industry and how software related to each IP mechanism. Finally, international treaties and organizations are explored to establish the environment under which normative influences have had over national IP reform.

Political Theory of Property

Intellectual property, at a fundamental level, is an extension of physical property rights over intellectual products. Revisiting the classical political theory of property, especially the discourse on the balance between private and public interests, establishes a basis for examining the demarcation between public and private rights that are present in modern IP regimes.

Throughout the ages, political theorists have wrestled with the "right" to property ownership, the interplay of private and public interests involved, and the economic effects of capital generation that property ownership allows. Classical political theorists

(such as Locke, Kant and Marx,) have significantly influenced modern perspectives of property ownership, by exploring the private right to property, the balance of these rights against the public interest, and purpose that property ownership plays in capital development. It is from these foundations of political theory of property ownership that modern intellectual property regimes inherit their perspectives on the purpose, construction, and economic impact of intellectual property, influencing the balance of rights protected by IP policies and responsibilities endowed. Examining these fundamental political theories and how they have been extended from physical property to intellectual property sheds light on the rationale behind the extension of IP protections over computer software.

John Locke alleged that this right was derived from Nature because the labour of free individuals over a natural resource produces an asset, thereby creating a right to possess the object created by that labour. (Locke 1980, §27) In his Second Treatise on Government, Locke promoted the idea of a natural right to property. This new object is then transformed from a freely exploitable natural resource into the private domain of the individual. The creation of a private domain was in his opinion essential to the definition of a public commons. Further expanding upon this idea, Locke asserts that people enjoy a natural right to unlimited accumulation of property. However, there is an inherent responsibility not to hoard an overabundance of property such that there is spoilage. This spoilage is undesirable to both the individual, who loses invested labor, and the public, which is denied the potential use of the good. In order to ensure that spoilage is minimized, Locke insists that property can and should be traded for durable goods or money whenever possible. These ideas of the natural right to private possession, the

designation of a commons that needs to be maintained, and the undesirability of spoilage are fundamental principles that appear to varying degrees within modern property regimes, including those dealing with intellectual property.

Kant and Locke both believed that it was by natural inclination that all free people must submit to state coercion under law regulating their freedoms. However, while Locke's liberal right to property may be a manifestation of the freedom of man, Kant expressed his concern that people will, by their nature, attempt to abuse the position of their freedom relative to that of others. (Kant 1970, 46-47) Laws must be established to regulate the balance between the individual right to ownership versus the preservation of freedoms retained by others. This charges the state with maintaining a balance between personal rights and public liberties through the application of law. The ideas held by state actors shape their views of themselves as regulatory authorities and constrain the policy prescription viewed as appropriate as how to best maintain this balance between private and public interests with regard to software. (Vogel 1996, 21)

Karl Marx's observations regarding the nature of capital development in industrial nations contributes a great deal to this particular study as well. The legal establishment of property ownership over intellectual assets enhances that asset’s potential for capital generation. It is the legal reforms to IP law that has been a focal point for economic arguments concerning intellectual property protections for computer software. The extension of protection for computer software under multiple mechanisms of IP ownership creates new ways for software to be exploited as capital. The reform of IP laws concerning software is further complicated by the application of protections under trade secret, copyright and patent laws. The adaptation of these different sectors of IP law

to protect software has created a complex system of relationships between producers and consumers. The benefits of multiple levels of ownership are counterbalanced by Marx's contention that the establishment of a legal right to ownership over objects of production introduces a mechanism by which people with a lesser capacity to generate capital could be subjugated. However, the extension of protections under one IP protection can come into conflict with the others, creating am area of legal ambiguity as to what public and private rights are protected. Since software can be produced and consumed by anyone with a computer, the broad application of strong IP ownership can have a detrimental effect on the ability of smaller producers to legally produce and consume software.

These classical theories have exerted a profound normative influence on how property ownership is perceived. The understanding that intellectual property policies maintain a balance between public and private interests has also been inherited. Current debates center on the "right" to intellectual property ownership, seeking to maximize the potential for capital generation through the strengthening of intellectual property protections for software. Public rights are often discussed in relation to the consumers of software.

The institutional role that the government plays in maintaining this balance of liberties is reflected in the focus that recent literature on intellectual property protection of computer software places on economic and institutional implications of reforms. The state assumes the role as the protector of the economy by designating regulatory agents and mechanisms to protect property ownership. In constructing these regimes, the state must contend with the liberal dilemma of balancing competing interests and goals: the private incentive to financial gain through strong mechanisms of ownership and

protection, and the public and economic benefits from low barriers to market entry in property regimes.

These laws and regulations can take on several forms: the regulation of market entry, the adjustment of strength and scope of ownership, and dispute resolution. Weak or ineffective barriers for legal recognition of property ownership limit capital generation and economic growth, while overly strong barriers to entry create monopolies. Further in keeping with its Kantian legacy, the strength and scope of property rights established by the state, as well as the methods of dispute resolution, must constantly be adjusted to balance the social and economic goals of the state, especially in an ever-changing marketplace.

Intellectual Property

With his declaration that "*Mental objects… are an object of exchange*," Hegel bridges the gap between physical property and intellectual property. (Hegel, section 43) By endowing intellectual works with economic value worth exchanging, ideas and knowledge become commodifiable objects of exchange to be regulated by the state. For the state to foster the development of an informational economy, it must increase the capital potential of those intellectual assets. Marxist theories on capital content that nation-states have achieved through the designation of property ownership through the development of a complex system of intellectual property laws.

The pursuit of increased capital potential within intellectual works poses certain problems for the state, however. "*The essential problem [of IP systems] is to strike a balance: enough protection to sustain incentive to the innovator, but not too much protection to allow for the maximization of the social good*." (Brown and Rushing 1990,

2) In order to resolve this liberal dilemma of balance between private and public interests, the nation-states uses intellectual property laws to establish a social bargain; the temporary assignment of exclusive ownership is endowed to innovators and creators in return for ensuring the social benefits from innovation. Individuals benefit from the temporary ownership, the rights to utilize and disseminate protected intellectual property, and the strength those protections provide. The public interest is protected by ensuring that those ideas and expressions are shared immediately and eventually introduced into the public domain.

Nations have developed a variety of mechanisms, such as copyrights and patents, over time to protect various forms of intellectual work. Over the past century, international organizations and treaties have been created to provide increased uniformity of these protections, ensure private financial incentives across national borders and foster the public interest. These developments in national and international intellectual property law have maintained the balance of private and public interests through increasingly complicated systems of rules and requirements. Of particular interest in this study are trade secrets, copyrights and patents.

While, intellectual property is an extension of physical property in many ways, there are important differences. Intellectual commodities are inherently non-exclusive in their distribution and utility and must extend a different scope of rights to property holders. (Weckert 1997, 103) In order to reconcile property laws for these attribute differences, the state implemented different forms of property ownership to protect ideas. Some of these differences are exhibited in the limited duration, scope and relative strength of rights conferred to the owner.

Table 2: Mechanisms of intellectual property protection

	Trade secret	Copyright	Patent
Scope	Hidden information and processes	Published works	product or a process
Registration	None	Voluntary	Required
Disclosure	None	Required	Required
Criteria	Reasonable effort to maintain secrecy	Original contribution	Novelty, utility and non-obvious
Rights	Damages for theft	Limit reproduction	Restrict utilization of the idea
Duration	Potentially forever	50 years minimum	20 years from registration
Strength	Weak	Average	Strong

(Source: WIPO)

While, intellectual property is an extension of physical property in many ways, there are important differences. Intellectual commodities are inherently non-exclusive in their distribution and utility and must extend a different scope of rights to property holders. (Weckert 1997, 103) In order to reconcile property laws for these attribute differences, the state implemented different forms of property ownership to protect ideas. Some of these differences are exhibited in the limited duration, scope and relative strength of rights conferred to the owner.

The other important differences appear in the location of balance each mechanism places between public and private interests. Trade secrets offer great duration, and possibly high claims for damages when violated, but are easily undermined and invalidated through reverse-engineering, independent invention and inadequate diligence in maintaining that secret. Copyrights are stronger, but only protect the expression contained within literary or artistic works. International agreements have made copyright automatically applicable at the time of publication, making registration with the state optional. However, it is through that registration that those creative works can be archived, eventually entering into the public domain upon the expiration of copyright.

Patents arguably hold the strongest relative protections for intellectual property. Sometimes viewed as protecting the idea itself, patent actually protect the specific implementation of an idea. The idea is fully disclosed in the patent application, which must be approved by the state's designated representative agency.

A stronger reliance on IP regimes as the foundation of knowledge economies fundamentally transforms the "*production, distribution and use of knowledge with profound implications for the economic and social well-being of nations and people around the globe*." (Polster 2001, 85) Polster argues that increased focus on IP generation has changed the organizational structure among knowledge producers, producing alliances and changing motivations and the costs of failing to cooperate. In the computer software industry, these effects can be amplified by the influence of multiple forms of IP ownership and the short lifecycle of software products and programming techniques. In addition to the influences that policy reforms within each sector can have on relationships among producers, there are also changes in the relationship with consumers of software. While Polster is concerned with the relationships between knowledge producers, the protection of private rights has affected the scope of rights enjoyed by the public to consume software.

The PC Revolution and Packaged Software

Prior to the PC revolution, software was typically custom designed for computer mainframes that were owned by the few businesses and organizations that needed them. The software provided a direct link between users and the mainframes they were using.

At the time, software was protected under trade secret laws, but the development of a broad consumer market of personal computers changed the conditions that software was developed under. (Nixon & Davidson 1997, 25)

There was no initial pressure to provide mass produced software available off the shelf, because there was no significant market for this commodity to be targeted to. While several computer manufacturers, such as IBM and Apple, had been selling computers to the mass market since 1976, it was not until the next decade that a number of important technological innovations began to appear. These inventions precipitated the emergence of a packaged software industry. In 1980, Seagate Technology created the first hard drive for micro-computers. The next year, IBM introduced the Personal Computer (PC), creating a mass consumer market for computer software. Further fueling the commodification of software was the introduction of larger capacity storage media. In 1981, Sony introduced its 3-1/2 disk drives, followed by Philips CR-ROM technology in 1985 (Mueller 2002, 14). This allowed for larger and more complex software programs to be developed and marketed.

The PC Revolution was fueled by more than technological innovation in computer hardware. One other major factor was critical for mass diffusion of computer systems and the increased capacity for capital growth of the packaged software market: the graphical user interface (GUI). In 1981 Xerox introduced the Star, the first PC with a GUI. This interface style was soon replicated by Apple and later by Microsoft. A GUI provides a simplified interface based on symbolic representation with icons, rather than complicated text entries from the command line. By decreasing the technical skill to operate computer hardware, the GUI allowed large segments of the populous to emerge

as a serious potential market for purchasing computers and consuming computer software. These technologies, coupled with the huge sales of the IBM PC, created market channels through which packaged software could be sold and a consumer market ready to buy them. Additionally, rapid introduction of new computer hardware into the market creates an accompanying void for software that takes advantage of greater performance capabilities.

Once a large market for computer software became available, software developers had to find a developmental model that minimized the duplication of effort and customization, while maximizing the potential for profit. The separation of software from hardware allowed the creation of an independent software industry. In order to mass market software as a commodity, operating systems (OS) and software separated into two distinct commodities. OSes are designed to utilize the latest hardware, while allowing startup companies to enter the market and offer new software applications for those OSes. This allowed software companies to focus on developing specific applications, such as spreadsheets, word processors, computer-assisted-design (CAD) systems, email readers and Internet browsers, without expending resources on maintaining compatibility with ever-changing computer hardware. Initially, numerous software companies provided competing applications, offering a multitude of choices to consumers. As applications were refined in later versions, these companies developed larger IP portfolios that were used to an advantage over competing products. The issue of the property rights by a company to their software and the rights of other companies to produce competing products soon became a heated focus of debate. Examples of this include the lawsuits over spreadsheet applications explored in chapter three.

The migration of software production in the computer industry from customized development to pre-packaged commodities did not occur without difficulties. The most arduous and controversial of these obstacles is software's classification and protection as intellectual property. Computer software holds characteristics common to three different forms of intellectual property: trade secrets, copyrights and patents. This juxtaposition of attributes, or "hybrid-character", of computer software provides national regimes latitude when implementing regulatory reforms. (Branscomb 1990, 48-53; Clapes 1993, 101)

In the early days of the computer industry, software was sometimes written in binary form or assembly, computer languages understood by hardware. This was unwieldy and awkward, requiring great skill on the part of programmers, yet limited the complexity of the code that could be written. Today, software is written in higher level programming languages (such as C, FORTRAN and Pascal), that could be compiled, or translated, into objects written in a lower level language that the computer can process. Computer code written and recorded in those higher level programming languages are referred to as source code. Compiled computer code is often referred to as object code or as being in binary form.

This hybridity mentioned by Branscomb stems from the composition of software in the development process. The division of software into source and object code through compilation introduces aspects that are characteristic to trade secrets. Processes and methods in the source code are obscured in the object code. Additionally, the expressive written form of the source code, as well as the incorporation of comments, makes it seemingly copyrightable. Additionally, since translations of copyrightable works are also given copyright protection, the object code that is compiled from copyrighted source

code is also protected. Finally, the useful nature of software, and the utilization of ideas that can be held within it, adds characteristics normally reserved for inventions. This juxtaposition of characteristics creates a zone of regulatory ambiguity for IP regulatory agencies.

Patents are considered the strongest measure for protecting computer software, whereas trade secrets are ultimately weak due to its expiration upon disclosure. Copyrights are quick, cheap and effective against literal copying, but only patents can protect the underlying idea. (Natoli 1996, 270) Yet, with these mechanisms, software continues to present obstacles as property and intellectual property.

Trade secrets and Software

Computer source code is a jealously guarded proprietary commodity. During the early days of the computer industry, when software was primarily custom written, software provided a direct interface between the computer hardware and the end user. Open communication between developers and clients was necessary to facilitate the development of software that conformed to the client's needs. However, in order to maintain trade secret protection for software, nondisclosure agreements (NDAs) among companies and programmers involved with software development are often used to maintain the secrecy. This mechanism for protecting the trade secret status of software is limited. While NDAs and the distribution in object code form can protect trade secrets within packaged software, independent creation by other software developers can undermine the value and advantage of secrecy.

To complement this mechanism, companies created shrink-wrap licenses for packaged software to maintain trade-secret protections while allowing for mass market

distribution. Often the terms in the End User License Agreements (EULA) typically include the prohibition of recompilation, disassembly, and copying. (OTA 1992, 85) Together, these mechanisms attempt to protect secrets contained within computer software packages.

Copyrights and Software

Initially, there was a great deal of confusion in the industry whether or not software should be copyrightable, patentable, or protected under some new mechanism. The WTO had discussions, but eventually settled on copyright protection. This allowed packaged software to be commoditized through its compilation into a "black-box" and "shrink wrapped" product, which consumers pay for the right to use. Upgrades or patches to packaged software can be considered "derivative works", provided that there are sufficient revisions to the registered work. In this manner software is very similar to the registration of new editions of volumes. A number of "fair use" provisions from published works are also available to consumers, such as the right to make backups and temporary copies. EULAs can also be used to limit consumer's fair use rights when using packaged software.

In the 1970s and 1980s, there were extensive discussions on whether the patent system, the copyright system, or a sui generis system, should provide protection for computer software. These discussions resulted in the generally accepted principle that computer programs should be protected by copyright, whereas systems using computer software or software-related inventions should be protected by patent. In the end, the WIPO decided that copyright law would provide the appropriate degree of protection for

computer software. This decision can be readily seen in the WIPO Copyright Treaty and the TRIPS Agreement. (WIPO)

Patents and Software

While copyright has been recognized by the international community as the appropriate mechanism for protecting computer software as IP, the subject of software patents is still hotly disputed. Software is certainly applies ideas in a useful manner, however the attributes associated with trade secret and copyrights can conflict with the underlying goals of patents. Additionally, the scope of the invention protected by a software patent can be ambiguous at best. Economies, particularly informational economies that rely on the judicial system to protect their rights, harbor a great disdain for ambiguous regulation and designation of property ownership. Patent theory is predicated upon the assumption that private incentives are necessary to promote innovation. However, the software industry has developed in an atmosphere largely devoid of software patents. The effect of instituting reforms establishing software patents, when innovation can come from unknown and unpredictable directions, can more economic harm than good.

International organizations and Treaties

The development of IP policies to protection computer software does not occur solely within the confines of a single nation. John Mayard Keynes understood the scope of political and economic effects of informational economies when he acknowledged that "*Ideas [and] knowledge… are things which should of their nature be international."* (Rodrik 1997, 72) Ideas and knowledge can easily traverse national borders, creating

jurisdictional conflicts between sovereign nations when infringement occurs. International organizations and treaties that focus on intellectual property have emerged, exerting a normative influence on national reforms, forestalling many national disputes over regulatory differences and protects private interests over larger areas.. Examining the normalizing influences that these institutions have on policy selection by national regimes is essential to understanding IP regulatory reforms concerning computer software.

The 1883 Paris Convention for the Protection of Industrial Property was the first international treaty to protect the rights of patent holders by ensuring that they could assert their rights internationally. Thee years later, in 1886, the Berne Convention for the Protection of Literary and Artistic Works, extended similar protections for copyrighted works. These two treaties marked the beginning of a process of international harmonization of intellectual property regimes.

The normative influence of the international community increased with the establishment of the World Intellectual Patent Organization (WIPO) in 1970. Founded for the purpose of "*[promoting] the protection of intellectual property throughout the world*"(*Convention Establishing the World Intellectual Property Organization*, article 3(i), WIPO 1967), the WIPO mediates intellectual property policy conflicts between nations, assists in the development of national legislation, provides legal assistance to developing countries, and disseminating information and services for international registration.

During the 70's and 80's, the WIPO held discussions concerning the appropriate protection mechanism for computer software. Copyright, patent, and even sui-generis

were all considered. During February and March of 1985, it was decided that copyright was the most suitable form of intellectual property protection to afford software. (WIPO) [*WIPO International Property Handbook: Policy Law and Use*]

The 1994 Uruguay Round of General Agreements on Trade and Tariffs (GATT) culminated with the establishment of the World Trade Organization (WTO) and the passage of the Trade Related Aspects of Intellectual Property Rights (TRIPS) agreement. Going into effect on January 1, 1995, the TRIPS Agreement serves to promote trade relations between members globally by lowering of trade barriers, enforcing of trade agreements, and the mediation of disputes. In 1996, the WIPO and the WTO cooperatively oversaw national compliance with TRIPS. (*source: WTO*)

In order to address recent obstacles of protecting intellectual globally, TRIPS "*[a]ttempts to strike a balance between the long term social objective of providing incentives for future inventions and creation, and the short term objective of allowing people to use existing inventions and creations.*" This balance is maintained by an expectation of compensation for invention and creativity, forced dissemination of knowledge, and flexibility accorded to government in tailoring domestic policy to social objectives. *(WTO 2001)* Covering various type of intellectual property ownership, including trade secrets, copyright, and patents. It sets minimum standards, principles of enforcement, and makes the WTO the dispute resolution and settlement body.

Article 9.2 of TRIPS confirms that copyright protection covers expressions and not ideas, procedures, methods, mathematical algorithms, and such. While seemingly obvious, this article serves to clearly establish a demarcation between ideas and expressions, so as not to cause interpretive conflicts as to what falls under the protection

of copyright law. Article 10.1 clarifies that computer programs (in either source or object code) shall be protected as literary works, under copyright law. Article 11 prohibits the rental of software programs without the permission of the author. Article 39 mandates that nations ensure that trade secrets be protected. Article 40 requires that nations maintain control over anti-competitive practices in contractual licenses. (WTO)

The WIPO Copyright Treaty (WCT) of 1996 states in the preamble that copyrights embodies a "*balance between the rights of authors and the public interest.*" Entering into effect in 2002, the Article 4 of the WCT establishes that "*computer programs should be protected as literary works*" as defined by the Berne Convention. Article 11 requires that member nations provide "*adequate legal protection and effective legal remedies against the circumvention of effective technological measures*" used to protect copyrighted works. (WIPO)

Both TRIPS and the WCT specifically address problems that computer software poses for nations as intellectual property. By setting a minimum level of standards, they exert a harmonizing influence on national policies and increase the capital potential for software. However, both treaties have explicitly recognized the Kantian balance of private and public interests in the establishment of required policy reforms.

While both treaties have made assurances for protection of computer software under copyright, these international treaties have only set a "*floor level of rights*" that countries are required to meet. (Samuelson 1997, 19) Nations can of their own initiative augment protections for software under trade secret and patent law. While trade secret protections are already fairly well defined internationally, there is no internationally accepted practice for patenting software. While "*some countries have embraced the*

patentability of computer software", others have chosen a more measured approach and only recognized so called "software related" inventions. (WIPO)

The focus on private interests in the commodification of software by regulators and most software companies in the US did not agree with everyone, however. Some of the technological elite were offended that commercial interests precluded free access to source code and the liberty to create software that they previously enjoyed. In 1984, when AT&T withdrew UNIX from the public sphere and started charging for licenses, responded by creating the GNU General Public License (GPL). The GPL, also called the "copyleft," is a license under which software could be freely used, distributed and modified while protecting the rights of consumers to access the source code. (Lessig 2001, 53-54).

Clauses in the license limited or removed entirely the characteristics of trade secrets and patents that software has. Copyright protection is the favored mechanism of protection of this license due to the creative latitude that is granted to software developers, but it is used only in a manner that allows transparent development rather than allowing proprietary systems to restrict choice or utility. Using the GPL, a community of developers committed to an "open source" development model, rejecting restricted access to source code and the patentability of software. In this manner, the community of open source developers has interests that mirror that of the public, desiring both "*competition and follow-on innovation*" and "*policies favoring freedom of discourse and the free movement of goods.*" (Samuelson 1997, p17)

Over the past decade, a number of interesting events have taken place. An open source operating system, Linux, has emerged from relative obscurity and has recently been adopted by influential computer industry companies, such as IBM. While the use of the GPL to protect software, the open source movement and Linux will not be investigated in depth in this thesis, they must be mentioned for one very important reason: in a global industry that has been the subject of continuous regulatory reforms under intellectual property regimes, open source software has yet to be directly addressed or contested under any IP system. As developing nations begin to shift efforts towards developing domestic knowledge based economies, particularly in computer software, the political and economic advantages of open source development will gain increasing importance.

Chapter Three: The United States of America

In this chapter, the IP reforms for computer software in the US are examined. The political traditions of rights and balance for intellectual property inherited from its founding fathers are explored. The chapter is concluded by a history of the development of the US computer industry under each of the three IP sectors and an examination of the US IP regime as a whole. Within each sector and the regime analysis, policy reforms are examined for associations with the state's concept of rights and their role of maintaining balance between individuals and the public.

The United States is the largest global producer and consumer of packaged software. The increased affordability and high degree of adaptability of computers have made them an integral part of all aspects of the modern US economy. Along with uniform hardware standards, this penetration has transformed practically every entity within the US economy into a potential consumer for packaged software. It is no wonder then, that with annual revenue in the packaged software industry reaching hundreds of billions, the computer software industry has become the fourth largest in the United States. The growth of the computer industry into a cornerstone of the information economy required the development of intellectual property laws with respect to software, including packaged software.

Intellectual Property traditions

Both the Declaration of Independence and the Constitution of the United States of America draw upon classical political theorists to define the structure and purpose of the United States. The Preamble of the Declaration of Independence establishes goals for the

fledgling nation, in such plain and unencumbered language that influences from Locke can be readily seen. (Sheldon 1991, 142)

> *"We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness.--That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed"*
>
> *(The Preamble to the Declaration of Independence)*

Locke's notion of "*free and independent individuals in a state of nature was adapted by Jefferson [to apply to the] free and independent states*" to compose the United States of America. (Sheldon 1991, 142) The Lockean right to property is echoed in the enumeration of "*life, liberty and the pursuit of happiness*" as the "unalienable rights" of all people. Jefferson's belief in the inherent equality of man places upon the state the Kantian responsibility of securing and regulating the liberties and freedoms of its citizens through measured and balanced laws. The establishment of regulatory authority over intellectual property is addressed in the Constitution.

The section of the US Constitution enumerating the powers of Congress clearly references the importance of intellectual property within the state, as well as the exchange of rights used to maintain balance between public and private interests.

> *"The Congress shall have the power to promote the progress of Science and the useful Arts, by Securing for a Limited Time, to Authors and Inventors, the exclusive Right to their respective Writing and Discoveries."*
>
> *(U.S. Constitution, article 1, section 8, clause 8.)*

Thomas Jefferson, as the author of the Declaration of Independence, and James Madison, as a coauthor of the Federalist Papers, have both wielded a great amount of influence in shaping the purpose and goals of intellectual property in the US. However, their ideas as to how and where balance between private and public interests lie were not always in agreement. Jefferson's incorporation of Lockean political values contrasted significantly with his opinions concerning intellectual property. While away in Paris, "*Jefferson had wanted to prohibit all monopolies, even limited monopolies, to authors and inventors*" and advocated for provisions in the Bill of Rights to that effect. (Malone 1951, 282)

Madison, on the other hand felt quite differently. He was convinced that "*The public good [embodied within the copyrights for authors and patents for inventors] fully coincides … with the claims of individuals.*" (Federalist 43) His endorsement of the copyright and patent system seemingly equates the private interests with the public welfare. Writing to Jefferson in Paris, Madison managed to persuade Jefferson that a system of patents and copyrights, modeled after European systems, may be acceptable. (Malone 1951, 282) While Madison did not question the utility of copyrights and patents, as Jefferson did, he failed to present any distinct differences as to how both public and private interests are maintained.

Due to his keen interest in science and inventions Jefferson held a more nuanced perspective on patents. The passage of the first patent act in 1790 placed the Secretary of State, a position held at the time by Jefferson, as the first patent examiner. Leading the Patent Approval Board, Jefferson a developed a rigorous series of principles and rules for determining the patentability of an invention. (Malone 1951, 282-283) In a letter to one

patent applicant, Jefferson expressed his opinion concerning the relationship between the individual and the public that is established by patents. Jefferson was greatly concerned about the detrimental effects that a monopoly on an idea, albeit a temporary one, exert on public liberties.

> *"If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea…He who receives an idea from me, receives instruction himself without lessening mine; … That ideas should be freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature. […] Inventions cannot, in nature, be the subject of property. Society may give an exclusive right to the profits arising from them, and as encouragement to men to pursue ideas which may produce utility, by this may or may not be done, according to the will and convenience of the society, without claim or complaint from anybody…*"
>
> *(Letter from Thomas Jefferson to Issac McPherson)*

During his tenure as Secretary of State, Jefferson's ideas concerning patents matured. The foremost of Jefferson's opinions on patents was that permanent property possession over an idea was fundamentally untenable, opting instead for the temporary allocation of rights balanced against the public interest. He accepted that "*ingenuity should receive a liberal encouragement*", as promoted by Madison, but remained mindful the implications that abuse of patents could exact on the public welfare. (Martin 1952, 42-43) Yet, while Jefferson accepted the utility of patent in spurring innovation, he

personally abhorred the notion of legally monopolizing any idea of his invention and never applied for a patent on any of his numerous inventions.

In 1793, soon after Jefferson stepped down from the Secretary of State, a bill was passed that removed the requirement of examination for patent applications. This effectively transformed the acquisition of a patent into an automatic process. Fortunately, the patent system reformed in 1836, incorporating many of the practices and requirements initiated by Jefferson, transforming it into the system the US employs today. (Malone 1951, 285)

Focusing on the social results when protecting intellectual property, he believed that ideas should be shared to the benefit of everyone. Jefferson and Madison's ideas on intellectual property both recognize its importance, yet differed on the perception of balance between the private individual and the public welfare with respect to patents.

Trade secret protection for computer software

The designation of trade secret protection under tort law existed long before the invention of the computer, much less the creation of software. Section 757(b) of the Restatement of Torts (1939) defines trade secrets as methods and processes that are kept reasonably secret and give its holder a commercial advantage over competitors. This provides a broad range of subject matter that can be protected as trade secrets, but is limited with the requirement that a reasonable effort must be made to protect those secrets. If another party duplicates those secrets by "fair and honest means," such as reverse-engineering, independent invention or accidental disclosure, there is no legally actionable recourse for the loss of those secrets. (Abbott 1990, 316)

However, trade secrets protections were only protected only under state law. This created a non-uniform system of laws in an emerging national industry. In order to address these legal inconsistencies, the National Conference of Commissioners on Uniform State Laws proposed the Uniform Trade Secrets Act (UTSA). Created in 1970, and amended in 1985, the UTSA was a way to harmonize trade secret protections across states within the US. (Abbott 1990, 332)

While a majority of states adopted the legislation proposed under UTSA, significant regulatory gaps remained. In 1996, the U.S. Congress passed the Economic Espionage Act (EEA) (18 U.S.C. §§1831-1839), in compliance with TRIPS, further strengthening trade secret protections within the US. By assigning federal criminal liability to knowingly stealing or misappropriating trade secrets, the EEA established a uniform national standard that broadly applied trade secret protections to "*all forms and types of… information, including…compilations, program devices, formulas, designs, prototypes, methods, techniques, processes, procedures,* ***programs****,* ***or codes****, whether tangible or intangible, and* ***whether or how stored, compiled…”***(18 U.S.C. §1839(3)) (emphasis added). The expanded scope of protections allowed increasing amounts of previously legally ambiguous knowledge commodities, such as computer code, to be protected under trade secret law.

Maintaining the secrecy of source code was constraining to the software industry. Open communication and sharing between application developers, operating system developers and hardware manufacturers require that certain segments of the code be made accessible. To preserve those secrets, non-disclosure clauses are added to contractual arrangements between companies.

Protecting secrets between software and hardware developers through contractual agreements is not the only concern for the software industry. The mass-marketing of pre-packaged software poses serious obstacles to maintaining secrecy as well. In order to protect their secrets, the software industry has started employing End User License Agreements, (EULA), also known as a "shrink-wrap" license. (OTA 1992, 83) EULAs are particularly popular mechanisms for asserting ownership over packaged computer software. It is a standard license agreement that is entered when the consumer opens the shrink-wrap packaging that the software comes in. Modern software applications typically bring up this license during the installation of the software, and require that the user indicate that they have read and accept the terms of the EULA.

While this practice protected the company secrets against theft, some of these EULA provided clauses that undermined consumer's fair use rights, such as making personal back-up copies and reverse engineering. When the enforceability of such EULA provisions started being called into question, the Fifth Circuit found provisions that those denied consumers their "fair use" rights were invalid. (OTA 1992, 86)

While scope of claims under trade secret law in the US for individuals has increased, the limitations made on behalf of the public interest were retained. Those rights to trade secrets protections can be undermined if the owner failed to maintain "reasonable measures" to protect those secrets and if that information is independently discovered. (18 U.S.C. §1839(3))

Copyright protection for computer software

The language in section 102 provides an inclusive definition of scope for copyright protection, while balancing that scope with the requirement of expression. The

Copyright Law in the United States provides protection for "*original works of authorship fixed in any tangible medium of expression, now known or later developed...*" (17 U.S.C. §102(a)). This sets as the scope of copyrightable material any original expressive work of authorship. The incorporation of language that allows copyright protections to be afforded to any new technology or storage medium allowed the copyright law to adapt to a rapidly developing computer technology industry. While the scope of copyrightable subject matter is defined in Section 102(a), the next subsection clearly defines what is not subject to copyright. Any "*idea, procedure, process system, method of operation, concept, principle, or discovery…*" is specifically denied copyright protections. (17 U.S.C. §102(b))

Section 106 enumerates the exclusive rights offered by copyright: the right of reproduction, creation of derivative works, and the public distribution through either sale, transfer of ownership or lending. (17 U.S.C. §106) Sections 107 though 112 provide limitations on those rights. Most notable of those are the "fair use" provisions under section 107. They deny claims of copyright infringement for acts of "*criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research…*" (17 U.S.C. §107) The establishment of fair use protects the public interest by making free speech and research goals higher priorities than the rights of copyright holders.

The US Copyright Act was modernized in 1976, yet computer programs continued to pose significant problems as IP. While a great number of rights were conferred to copyright holders, the scope of public rights remained unclear. To address these concerns and to clarify the role that copyright ownership would play with regards to

software, Congress established the Commission on New Technological Uses of Copyrighted Works (CONTU). CONTU proposed a number of changes and amendments to the Copyright law, which were adopted by Congress in 1980. (OTA 1992, 67)

The Copyright Amendments of 1980 clarified the role that copyright played in protecting computer software and defined the balance of rights between copyright holders and the general public. Section 101, containing the legal definitions used under copyright law, was updated to define a "computer program" as *"a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result."* To clarify certain limitations to private rights and reestablish a balance with public rights, Section 117 was created. Section 117(a) allowed users to adapt software when it is essential to that software's use on a machine and to ensure the user's right to make a backup copy for archival purposes. Section (b) preserved the concept of "first sale"[1], but placed the restriction that all second sales must be accompanied with the original copy.

Copyright protection for software had been established; however software poses problems in defining the dichotomy between the idea and expression embodied within it. (OTA 1992, 22) By 1980, Apple Computer already had its Lisa computer on the market for a couple of years. Feeling pressure to bring its PC to the market, IBM licensed MS-DOS from Microsoft (MS). However, when MS released its Windows software in 1983, Apple immediately sued MS for copyright infringement, claiming that Apple's copyright infringement on its GUI. Apple also sued Hewlett-Packard (HP) as well, claiming copyright HP's product is NewWave was an extension of MS's Windows software and thus also infringed. In yet another twist, Xerox sued Apple for unfair competition,

[1] The "First sale" doctrine refers to the right of consumers to dispose of, or transfer ownership, of an object of copyright material after its initial purchase. This does not extend, however, to copying the entire copyrighted work.

claiming that Apple copies the ideas for windows, menus and such from Xerox's Star workstation. The court dismissed Apple's claims against Microsoft. (Warshofsky 1994, 149-152) / ["Software Copyright: Apple Appellant" The Economist (March 26, 1988) p66] Xerox's lawsuit against Apple was dropped for similar reasons as Apple's case against Microsoft. Later, Microsoft purchased a technology license from Apple to prevent future misunderstandings.

The Courts further expanded the scope of copyright beyond the source code to cover the expressive parts of a software package's construction. In *Whelan Associates, Inc. v. Jaslow Dental Laboratory, Inc.* the 3rd Federal Circuit Court of Appeals extended "*copyright protection of computer programs […] beyond the programs' literal code to their structure, sequence and organization*." (Clapes 1993, 30) By providing copyright protection for a program's structure, sequence and organization (SSO) as an expressive component of computer programming, the structure, screen outputs, and essential functions were protected, even if the code was not directly copied. (Mody 1990, 217)

The lawsuits on the "look and feel" of software programs continued into other areas as well. The Lotus Corporation filed several lawsuits against other software companies, such as Paperback Software International and Borland International, claiming that their spreadsheet software programs infringed on the copyrighted "look and feel" of Lotus 1-2-3 menus and interface. (Warshofsky 1994, 146; 148/Clapes 1993, 50; 61) While Lotus won the case against Paperback, Borland won their case on appeal in the CAFC. The interface that Lotus developed had become extremely popular with the consuming public, and the Court was concerned that copyright over software interfaces would create a monopoly and diminish competition. *"If a developer can successfully*

assert copyright protection in an interface that has become the de facto standard," the judge was concerned that the prolonged duration of copyright "*will affect not only the market for the program, but also the markets for complementary products.*" (Samuelson. Aug 1995, 16) Deciding that permitting the copyright of file menu structures would pose serious legal difficulties to users who wrote macros, requiring consumers to completely rewrite macros for each application, the CAFC found that infringement would be denied when emulating de-facto standards set by successful software programs. (Samuelson Aug 1995, 17) This protects the rights of companies to emulate innovators and the minimized interface divergence, so that the public would benefit, yet fails to clearly define what constitutes a defacto standard.

The copyright cases on the "look and feel" of software programs continued in the 1992. In the case of *Computer Associates International v. Altai, Inc.*, the 2nd Circuit Federal Court of Appeals created the three step "abstraction/filtration/comparison" test for determining copyright infringement. In this process, software code is divided into three levels of abstraction, filtered to determine what was dictated by necessity or efficiency (as well as segments that came from the public domain) and finally a comparison of the final output between the programs is made. The presence of substantial similarities between the alleged infringing code and the infringed code is interpreted as proof of copyright infringement. In the Court's pursuit of protecting the individual IP rights, they have burdened themselves with a complicated, and ultimately subjective, procedure for determining the existence of copyright infringement in software code.

The Department of Commerce (DOC) is the supervisory office for copyright within the US and is responsible for setting national copyright policy. The Copyright Office serves as the registration body for copyright, and is part of the Library of Congress. It the oldest federal cultural institution and assists in research for Congress.

The Office of Technology Assessment (OTA) identifies the promotion of the public interest and knowledge as a "fundamental goal" of the copyright system. (OTA 1992, 56). Under Library of Congress' charter of providing a comprehensive collection of all human knowledge for Congress and the American people, the Copyright Office's primary goal is to actively register and maintain records of any and all copyrightable material for future generations. By ensuring the eventual inclusion of all registered works in the public domain, the public interest is protected.

While the judicial system within the United States presents itself as the ultimate defender of private and public rights, the U.S. Copyright Office maintains passive regulatory power over the copyright of computer software: the registration process. In order to pursue legal action on copyright infringement, prior registration of that material is required. Coupled with a low application fee, this system promotes the registration of copyrightable works, including software.

Obtaining copyright protection through the Copyright office is similar to that used by other literary works in many ways. An application for copyright registration on computer software has four requirements: a completed application, the $30 registration fee, a deposit of the material to be copyrighted, and a copy of any printed manuals or documentation that accompanies the software.

These requirements are the limit of those similarities. Several distinct accommodations exist, due to software's "hybrid nature." In particular, the exact nature of the submitted copy of the software depends significantly on its composition. If the software contains no secret information, then the first 25 pages and last 25 pages of source code "*reproduced in a form visually perceptible without the aid of a machine or device, either on paper or in microform*" must be deposited with the application. If the program is less than 50 pages, then entire source code must be deposited. Subsequent registration of updated versions of software, whether or not is previously registered or in the public domain, must be accompanied by first 25 and last 25 pages. If revisions to the software are not within those pages, any 50 pages of source code that represents those revisions.

The registration process has been further adapted to accommodate computer software as copyrightable material. Intermingled trade secrets within software to be registered posed unique problems for the registration of computer software. In order to encourage registration, while protecting valuable industry trade secrets, a series of complicated options have been made available.[2] While many the Copyright Office have been very accommodating towards software producers, it does impose two clauses on

[2] In order to take advantage of these options the application must include a cover letter stating that the code deposited contains trade secrets. The deposit of code can take the form of following options:

- The first 25 and last 25 pages of **source** code with trade secrets blocked out,
- The first 10 and last 10 pages of **source** code, with nothing blocked out,
- The first 25 and last 25 pages of **object** code and 10+ sequential pages of **source** code, with no sections blocked out, or
- For programs less than 50 pages in length, the complete **source** code is necessary, but trade secrets may be blocked out.

Revisions to software containing trade secrets also have special deposit requirements. If revisions to are not made in the content of the original deposit of code, then 20 pages of unblocked source code that contain the revisions may deposited. If sections must be blocked out, in order to protect trade secrets, then 50 pages of source code are required. (U.S. Copyright Office)

deposits containing trade secrets: the blocked out portion must not comprise a significant proportion of the deposit, and the remaining computer code must be substantively original. (U.S. Copyright Office)

The low copyright application fee, coupled with the requirement of registration prior to legal redress, the private individuals are encouraged to register all copyrightable material, including computer software. Providing several options for protecting trade secrets in software code, and the registration of revised versions of software programs, further encourages the registration of program works. The eventual passage of those materials into the public domain serves to achieve the goal of copyright to enrich the public welfare.

Patent protection for computer software

In addition to trade secret and copyright protection, the protection for computer software under patent law has been pursued by some, but not all, software manufacturers. "*Because the US has the most developed software industry in the world, it has one of the first countries*" to address if the issue of software as patentable subject matter. (Nichols 1999, 25) The lack of any other national or international stance on the patentability of software allowed the US to establish its own guidelines without the external influences present during trade secret or copyright policy reforms.

Originally, the Patent Office denied patent applications for software inventions. Once the courts recognized software as patentable subject matter during the 1980's, the Patent Office was forced to reevaluate its patent examination guidelines. Afterwards, the number of patent applications for software-related inventions increased dramatically. In

1980 alone, the Patent Office received 250 patent applications for software-related inventions. By 1999, this number rose to over 21,000. Similarly, the number of computer-related business method application rose form 1000 in 1997 to 2,500 in 1999. (Lessig 2001, 208-209)

Kerr examines why this scope of patent protection for computer software has been so difficult to establish. "*The appropriate scope of protection for computerized algorithms has proved to be a remarkably difficult question.*" Despite establishment of software as patentable subject matter, there remain a great deal of debate within legal circles and the software industry concerning software patents. Kerr describes people's opinions on the matter of software patents falling into two camps. These camps hold differing perceptions of what characteristics of an invention that software possesses and the effects of recognizing patent ownership will have on the software industry are. Within the first camp are those who believe that broad patent protection appropriately protects the inventor's right to profit from their works. The second camp believes that a narrow interpretation of patentability is required, in order to encourage follow-on innovation and creativity. (Kerr 2002, 47) The first camp focuses primarily on the individual rights of the inventor, while the second camp is more concerned with the effects on the computer software industry as a whole.

According to Kerr, mass marketed computers "*divide the 'brains' […] from the 'brawn"'* where the computer algorithms that constitute the 'brains' and the hardware is the 'brawn'. (Kerr 2002, 48) Increasing hardware capacity for processing and data storage, combined with more powerful and robust programming languages, allows software programs can being to emulate a greater number of hardware capabilities. As

software virtualizes hardware functions, the distinguishing characteristics of patentability embodied within physical inventions becomes blurred. Since the patent system was designed for physical inventions, rather than creations purely of the mind, making the determination of the appropriate scope for software patents ambiguous. (Kerr 2002, 48)

Differing opinions over the potential effect that software patents can have on the computer software industry has spurred discussion. Proponents view patents as the next logical mechanism for protecting investments in software development. Opponents are fearful for the chilling effect that could be exerted on creativity and innovation within the industry, pointing out that the patent system is ill equipped to examine software patents and that the industry has preformed well without them so far.

Classical patent law was constructed under a "single-step framework", where an input was transformed in one step, through a machine or process into an output. (Kerr 2002, 49) Computers, on the other hand, perform a multitude of functions: word-processing, numerical computations, playing music, or acting as a communications center. The function of the computer depends on the software used. This inserts an additional step; the user's input is processed by the software, which then directs the hardware to perform actions to create an output. The difficulty of patenting a two step process lies in the determination of what is patentable. (Kerr 2002, 51-52)

The patentability of computer hardware is scarcely questioned because it does not (currently) adapt or change according to function. Software proves difficult for patent systems because it is fundamentally different across the various functions that a computer performs. "*The one-step framework offers no conceptual middle ground*," leaving an "*all or nothing*" choice for patentability of algorithms. (Kerr 2002, 53-54)

Software also has other characteristics that significantly differ from traditional inventions. Aside from the close interrelationship that software has with algorithms is the lowered barrier between an idea that the expression of that idea in software. *"[P]atent laws have existed because the physical world is difficult to master: while it's easy [to generate an idea], it's usually hard to implement the idea in the real world.*" (Kerr 2002, 54)

During the 1950s and 1960s, very few within the PTO and the Courts understood the "physical constitution" of software and appropriateness of patent protection. (Nixon; Davidson 1997, 25) In *Gottschalk v. Benson*, the Supreme Court denied patentability for software that converted binary coded decimals into binary numerals. The Court then decided that software was not patentable until Congress declared otherwise. After the ruling, lower courts with more computer savvy judges attempted to circumvent those restrictions. (Nixon & Davidson 1997, 25) Prior to the *Diamond v. Diehr* case, the PTO repeatedly denied applications for software patents. The PTO's stance was overruled in 1981 when the Supreme Court found that the embodiment of an idea in software was insufficient reason to deny it patentability.

The various lower court circuits provided uneven rulings on patent lawsuits concerning software. Plaintiffs take advantage of this uneven interpretation of the law by selecting favorable jurisdictions to file suits in. In order to harmonize the interpretation of patent law in the US, Congress created the Court of Appeals for the Federal Circuit (CAFC) in 1982. (Mody 1990, 215/Warshofsky 1994, 64)

Prior to the creation of the CAFC, the courts were concerned that patents would create monopolies. The CAFC, an entity that has largely affirmed patent validity, has

changed the dynamic of asserting legal ownership of ideas embedded within software via patents. With an increased likelihood of retaining patent validity, large patent portfolios became especially powerful negotiation tools. Hardware manufacturers, such as IBM, have started vigorously patenting and using cross-licensing to provide a defense against future litigation. (Kerr 1988)

In the 1994 case of *Stac v. Microsoft*, MS failed to negotiate a license for the rights to include Stac's file compression technology into their operating system. They still included it, and were sued. MS was found guilty of violating Stac's patent, and were fined $120 million for infringement. A “stampede” in software patent applications was ignited by similar federal court rulings on the matter during the later 1990’s. This surge in applications forced the USPTO to respond by issuing its “Finalized Examination Guidelines for Computer-Related Inventions” in 1996. These new guidelines clarified how software and business-method patent applications should be examined.

The computer industry swiftly took advantage of the increased likelihood of obtaining software patents. MS used to only have a few patents, while today it has a portfolio containing almost 2000. Software developers, however, are not the only companies interested in filing software patents. Comparatively, IBM has almost 20,000 software patents and earns roughly $1.7 billion annually from licensing alone. (Koch 2003)

In 1991, the PTO published a Request for Comments on the IP protection for computer programs. A majority of the response focused on the issue of computer-related inventions. (OTA 1992, 55-56) The USPTO held a series of public response conferences, allowing the public to make comments on the revised guidelines for examining computer

software patents. Many companies, such as Adobe and Oracle, originally did not want software patents while others did. A great deal of concern was expressed regarding the apparent inability of the PTO to conduct effective prior art searches, and the problems that software developers in general would face.

The Omnibus Trade and Competitiveness Act (OBRA) of 1988 introduced a number of important changes to regulatory policies for patents. OBRA made it a violation to import goods into the United States that were in violation of a patent. It also removed the requirement for patent holders to provide proof of injury before applying for relief under section 377 of the Tariff Act. (Abbott 1990, 311) These changes extend the scope of US protection of domestic intellectual property rights.

Another significant reform the OBRA introduced was the transformation of the Patent and Trademark Office into a Performance-Based Organization. Renamed as the U.S. Patent and Trademark Office (USPTO), it derives its revenue from its application fees, instead of endowments from Congress. This change places the USPTO in the precarious situation of handling an increased number of applications with insufficient resources, creating quality control problems at the USPTO.

In the 1998 case *State Street Bank & Trust Co. v. Signature Financial Group*, the US CAFC found that '*using mathematical formula with the aid of a computer is patentable when it produces a "useful, concrete and tangible result"'* [US Court of Appeals, Federal Circuit 96-1175,-1106,-1091 (1997)] This case centered around the patentability of a hub and spoke fund management system created by the Signature Financial Group. A lower court had denied patentability for the software, but the CAFC found otherwise.

The American Inventor Protection Act (AIPA) of 1999 was amended US patent law, so as to comply with the Uruguay Round of trade talks. It established the "first inventor defense", protecting inventors from claims of patent infringement if they can prove they were practicing the patented subject matter at least one year prior to the filing of its patent application. Another part of the AIPA required that the USPTO publish applications after 18 months after submission.

The DOC is the supervisory office for patents within the US. The PTO operates under its jurisdiction, and is responsible for examining and registering patent applications. In 1990, the Secretary of Commerce created the Advisory Commission on Patent Reform, to handle the development of policy reforms. One of the issues that it examined was the definition of "computer-related inventions" used by the PTO. (OTA 1992, 9-10)

As part of an initiative created by Al Gore and the National Partnership for Reinventing Government, certain government functions were streamlined and made more efficient by turned them into "performance-based organizations" (PBO). The DOC announced a plan to make the PTO an independent PBO. An intense amount of criticism was expressed concerning the Congress' appropriation of roughly 1/3 of the PTO's revenue from fees and used elsewhere. By transforming the PTO into a PBO called the U.S. Patent and Trademark Office (USPTO), it would generate its funding from application fees rather than allocations from Congress. (McGeever 2000) This transformation also had the intended effect of making the patent office more responsive to market demand for patents and more efficient in handling examinations.

To maintain a quality examination process, the patent office uses prior art, existing technology and inventions, to verify that applications meet the criteria for patentability. Prior art can be used to limit unfair patenting of ideas, but software reliant on trade secrets or copyrights provide difficulties for patent examiners. The PTO is faced with the daunting task of distinguishing between patentable and non-patentable inventions with an "*incomplete database of 'prior art' for software-related inventions.*" This severely impairs examiner's ability to distinguish the "novelty" and "non-obviousness", or the lack thereof, for patent applications on software-related inventions. In the software industry, prior art is evidenced in the products. Since there is no comprehensive database of software available to the PTO, a large gap in created in prior art searching. (OTA 1992, 24)

The US patent system considers prior art searches essential for protecting innovation from infringement and abuse. Not only could patents be awarded to entities other then the "true" innovator, but a significant potential for abuse is created. Companies could apply for questionable patents on ideas that have already ingrained themselves within software packages and choose to litigate in order to extract large sums. This fear of creating an environment that favored litigation not only threatens large companies, who could end up paying millions in fees, but also small companies that might not have the financial capacity to fight back.

Responding to this fear, the private sector moved to create the Software Patent Institute (SPI) as a database of software prior art. The SPI is tasked with goal of making "*available to the USPTO and the public, a database of software techniques, especially the non-patented ones.*" (SPI) These services help to ensure that the USPTO can conduct

comprehensive prior art searches, protecting the ability of developers to develop software without fear of litigation from invalid software patents. (OTA 1992, 56)

The relationship between the patent office and the courts system blurs the line of responsibility for the validity of patents approved by the patent office. A system of judicial oversight creates an environment under which patent examiners could perceive the courts as the mechanism to "weed out" invalid patents. However, bad patents could still be leveraged to obtain settlements, and might even be affirmed by liberal court decisions. As part of the USPTO, the Board of Patent Appeals and Interferences (BPAI) handles appeals to claims rejections and interference suits. When applications are rejected, applicants can take their case to the US District courts or the CAFC for judicial review of decisions by the BPAI. (WIPO national profile)

Even with the added measures of well defined examination guideline and a more complete prior art database to ensure high quality patents, the relationship between the USPTO and the court system has changed the dynamics of patents in the software industry. When the USPTO grants a patent, it "*confers the legal presumption of validity on that patent.*" (Warshofky 1994, 163-164) However, the system of judicial oversight offers the patent office the opportunity to rely on the courts to remove "bad" software patents from the market. (Clapes 1993, 105)

While a software patent can be challenged soon after it is granted, undermining the validity of software patents in court of law offers poses several obstacles. Legal expenses spiral upwards quickly and the plaintiff can choose a court district sympathetic to their interests. Additionally, there must be sufficient proof of prior art. This can be quite difficult to obtain considering that software development is predicated on

maintaining levels of secrecy. Additionally, there may have been aspects of software programs and packages that were not considered important enough to document. This makes disproving the validity of a patent in the court system potentially quite difficult and very expensive.

Oversight on patent applications by the court systems places a great deal of interpretive latitude at the disposal of the judiciary, allowing the "*real scope of patents [to be] defined by the courts.*" (Clapes 1993, 109) The Federal Circuit has decided upon a stance of openly accepting computerized algorithms as patentable subject matter. In *AT&T v .Excel Communications*, the court indicated that permitting patent protection for software is "*responsive to the needs of the modern world.*" (Kerr 2002, 58-59)

Adjusting its rules and procedures to accommodate software, the PTO found itself erring on the side of caution. By holding high qualifications for patentability, the PTO attempted to protect the public interest by not permitting the recognition of bad software patents. Recent changes to law permitting the patenting of software, coupled with its recent transformation into a PBO, has forced the USPTO to redefine its perception on how it regulates patents. It now seeks to become more "customer" focused and responsive to demands for quality, efficiency and speed in application examination. The American Inventor's Protection Act (AIPA) of 1999 further raised the incentive to process applications quickly by providing applicants with more rights and protections against slow processing by the USPTO (USPTO 2000). This places the rights of individuals to profit from patents, or at least patentable subject matter, over the office's ability to protect the public interest. It is, however, consistent with the privatization of

government services and attempts to hold the office liable for failing to meet certain goals.

The court system has promoted itself as the ultimate defender of individual rights. In protecting those rights, the court system has chosen to force existing rules for patents to apply to computer software, and doing so sometimes results in decisions that fail to maintain a balance between public and private interests. "*Absent legislative action, the courts will do their best and try to squeeze the new facts into the old law, resulting either in overly broad protection form computerized algorithms, or very little.*" Often times, the only way to correct any imbalances caused by judicial decisions concerning software patents has been by the passage of new laws. Perhaps the only the only way to prevent further judicial imbalance through the litigation of software patents is through the introduction of preventive legislation. (Kerr 2002, 59)

Regime profile

Over the course of the past two decades, IP protection for computer software within the US has extended beyond computer code. Currently, the US regime protects four aspects of computer software: "*the program function, the external design, the user interface, and the program code.*" (OTA 1992, 22) The extension of IP protection over each aspect has been primarily motivated by liberal ideals, to be followed by adjustments reestablishing a balance with public interests. The OTA report identified the Courts, PTO, and the Copyright Office as all helping to shape the boundaries of protection for computer software. (OTA 1992, 11) The IP regime within the US can be decomposed into three primary institutions: the legislative body that creates laws, the regulatory agencies that register and preserve intellectual property, and the judicial system that

enforces compliance with those regulations. Constitutionally, Congress wields the greatest power to set IP policy, allowing it to increase or decrease IP protections in accordance with international agreements. The regulatory agencies, the Copyright Office and the USPTO, administer the laws and regulate the allocation of IP in accordance with those laws. The Courts serve to enforce those laws against transgression and protect private interests. The reality of the relationship between government agents has been shown to be significantly more complicated.

"*[D]iscussion about the U.S. intellectual property system is based on the assumption that, from an economic perspective, 'better' or 'stronger' intellectual property protection is unequivocally 'good'.*" (OTA 1992, 187) This is has especially been true in the computer software industry, where companies have sought stronger protections for their investments. Sometimes these efforts have been invested in technical measures, and other times through legal proceedings. As a result, the reformation of the US intellectual property regime to accommodate computer software has been led primarily by the judicial system. This has forced the registration agencies, and sometimes Congress, to adapt IP policies in response to the Courts.

While the legislature and other regulatory agencies had adopted a more conservative "wait and see" approach to extending IP protections for computer software, the Courts, acting as policy-makers, have extended liberal protections primarily for individuals, relegating the public interest to a secondary concern. These judgments established a copyright and patent case law for computer software that was eventually integrated into law. (Lessig 2001, 200)

Congress' deference to the judicial system in the expansion of protections for computer software and the apparently diminished concern of the public interest has caused the OTA to states that "*Congress has 'struck a balance' in favor of non-protection.*" (OTA 1992, 86) Following a similar vein of thought expressed by Madison, the Supreme Court thinks that personal incentive through financial gain is the "*best way to advance public welfare.*" (OTA 1992, 57)

With a great deal of latitude in interpreting patent and copyright law, the Courts have affected a great deal of influence in shaping US IP protections for computer software. The exact effects that court rulings on IP law will have on the software industry is uncertain, however it is clear that judicial ruling can drastically change the economic landscape of producing and consuming software. DeSoto describes the tremendous influence that the court systems have, declaring that "*No group- aside from terrorists- is better positioned to sabotage capitalist expansion [than lawyers]*." (DeSoto 2000, 198) DeSoto's lamentation of the entanglements that the judicial system can cause for property law, especially IP law, is certainly well founded. The Courts are certainly endowed with the authority to defend an individual's intellectual property rights and can perform admirably in individual cases. However they lack the resources and structure to investigate the possible ramifications that the extension of protections over software create for an industry and the public as a whole.

In this chapter, is has been shown that the US possess a strong individualistic interpretation of rights, which are largely protected through the court system. The demarcation of balance and the preference for liberal individualism can be associated with its political history of rights and development of the computer software industry.

The prioritization of protecting individual rights is so high that those rights can be asserted in court when they are contrary to state policy. While lawmakers can be lobbied to amend laws, the courts have often been avenue of choice that companies in the US software industry have traditionally chosen to obtain stronger claims to IP rights over computer software. While the courts have extended increasingly liberal property ownership for software, those rights have been balanced against larger public through specific limitations.

Chapter: Four Japan

Japan has over a 2000 year history of government regulation and policy reform that have shaped the recognition of rights within Japan and the government structures that protect them. A uniquely Japanese history of political, economic and industrial development has influenced the balance between public and private rights to intellectual property and the application of IP law to computer software. Over the course of its history, the Japanese government has incorporated various Western ideas, such as Lockean notion of individual "rights", yet has maintained its own style of regulation over the economy and its relationship with the private sector. This has resulted in a modern Japan where the bureaucracy, rather than the courts, leads policy reforms.

It is the Japanese interpretation of "rights", an economic policy driven by a strong centralized bureaucracy and the unique circumstances surrounding the Japanese software industry that have influenced a set of intellectual property reforms in Japan that vary significantly from those found in the US. It is these contexts that have shaped Japanese IP reforms to resemble US policies, yet establish a balance between public and private rights that differs from the US. While US policy reforms can be perceived as driven primarily by the pursuit of individual rights to property ownership, the Japanese bureaucracy has moderated the extent the judiciary can affect policy reform through the introduction of a variety of mechanism, including dispute moderation. This has enabled policy reforms to be planned by government regulators to meet national economic goals, rather than the strengthening of individual rights to property ownership.

In this chapter, the arrangements of regulatory agents for intellectual property in Japan, as well as the historical foundations, are explored. In order to gain a broader

understanding of the Japanese government's perspective of public and private rights balanced in the protection of intellectual property, the political and industrial history of Japan, the incorporation of the Western political concept of "rights", as well as the development of Japan's current intellectual property regime are explored. This serves to establish the government's patterns of interaction with the private sector, economic intervention and the bureaucracy's use of industrial policy.

Historical and Institutional Legacies

The Meiji Reformation

During the post-Tokugawa era (1600-1868), there were fundamental changes to the relationship between market interests and the government in Japan. With the establishment of the Tokugawa government under the Meiji Restoration, "the shogunate system was transformed into a central state with institutions modeled on those in the west. The Tokugawa class system was abolished. While neo-Confucianism had placed the merchant class at the bottom of the social hierarchy, merchants had been able to advance themselves socially due largely to large debts accrued by the daimyos (military aristocrats). With the Meiji Restoration, although "*the merchant class… was swept away and the scholarly elite took over the reins of the economy* ", a close working relationship between the government and business was forged. In this new relationship, both groups shared a common "*vision of a Japan that could stand on even ground with the West.*" (Baughn et al. 1997, 63) It was from this time, until the 1930's, that liberal ideas from the West gained a great deal of influence in Japanese politics.

The political landscape in Japan changed significantly during this time. Central to the Meiji Reforms was the centralization of political power in new governmental institutions in Japan. The Constitution created in 1889 created and legitimized the Emperor as the supreme authority in Japan. Only the Emperor had the authority to amend the constitution (Hayes 2001, 21). During the prewar era, the bureaucracy became dominant players in Japanese policymaking. Even though the reconstruction of Japan reinforced a common set of political ideals between Japan and the West, US attempts at democratization and reform after WWII allowed the bureaucracy to retain significant strength in the Japanese political system. (Hayes 2001, 37-38) “

“Rights” in Japan

Particularly important to this discussion is the influence and incorporation of Western notion of individual rights, and in particular the Lockean notion of the individual “right” to property ownership. After the Meiji Restoration, traditionalists were worried that Western influences would dominate reforms, supplanting traditional Japanese cultural values. The spokesman for the Japanese traditionalists, Kuga Katsunan, expressed both the respect and reticence towards the Western ideas in an 1889 article published in the *Nihou* newspaper. “*We value the Western theories of rights, liberties and equality; And we respect Western philosophy and morals… Above all, we esteem Western science, economics and industry. These, however, should not be adopted simply because they are Western; they ought to be adopted only if they can contribute to Japan’s welfare.”* (Beasly 1990, 98-99)

The incorporation of European ideals into Japanese law during the Meiji Restoration proved problematic at times. While there were many parallel concepts in both

cultures, there was no direct translation for the Western concept of “rights” in Japanese. Mitsukuri Genpo, attempted the first synthesis into Japanese by combining the characters for correctness and justice (“tadashii”) with law/regulation (“ritsu”) to form “reiritsu.” This word did not convey the same meaning as it did in Europe, however. Mitsukuri Rinsho, Genpo’s grandson, introduced the Chinese translation of rights, “kenri”, into Japan in 1865. (Feldman 2000, 18)

The word “kenri” poses its own problem for interpretation in Japanese. The first ideogram used for the word, “ken” (K), was used when describing a quantity, amount or volume. The second ideogram, “ri”, had two possible character interpretations. The first interpretation (K1) was in reference to a good situation or set of circumstances, but later came to mean profit, gain, benefit or advantage. The second interpretation (K2) was used when discussing reason, justice, truth or principles. (Feldman 2000, 18-19) For centuries, both versions were used. (K1) was used in legal and official documents, while (K2) was used primarily by intellectuals. Over time, (K1) became the dominant representation for “kenri”. This combined authority and power with benefits and interests. (Feldman 2000, 19)

It is in this way that rights in Japan do not retain the same connotations typically afforded by Western political philosophy. The pervasive acceptance of this definition exhibits deep rooted effects on how rights are perceived in Japan and the measures that the government is willing to implement to protect them.

The Mythical Japanese Litigant and the Japanese courts

The pursuit of intellectual property rights through the court system, as shown in the US, has not occurred in Japan. Although the perception that the Japanese disdain

litigation is a myth, there exist real obstacles for using the courts as a mechanism to extending stronger IP protections for computer software.

John Haley asserts that there is no evidence to support the stereotype that the Japanese are litigation averse. (Haley 2001, 118) Surveys that Haley conducted showed that a majority (64%) would pursue litigation if they were forced to. Yet the myth of Japanese as "reluctant litigants" does contain some elements of truth. The primary truism reflected in the myth is that Japanese social organization and values favor mediated dispute resolution. (Haley 2001, 120)

Stewart Scheingold describes the "strategic assertion of rights" in Japan as a "politics of rights", where actors frame, discuss and debate issues of rights through the selective invocation of rights. The invocation of "rights" during a personal dispute is inappropriate because it displays an overly uncompromising attitude. Using "rights" during a dispute is then only useful in those cases where a negotiated agreement is impossible. Feldman describes the interplay between the myths of right, the strategic use of rights assertion and the legal/political outcomes as the "ritual of rights." (Feldman 2000, 4-5)

The invocation of rights through litigation does not ensure that the courts will be effective in reforming social policy as found in the US. Institutional mechanisms for conflict mediation are created by the Japanese bureaucracy in response to social conflicts of all forms. Litigation can be used to articulate the conflict, but arbitration by some trusted third party is the preferred response by the bureaucracy. (Upham 1987, 18) Upham describes the role that the judiciary plays in developing social policy as being judge-centric, as found in Western nations, except that successful litigation receives a

different reaction from the bureaucracy. The bureaucracy responds to the judicial decision by discouraging future litigation by providing alternative methods of dispute resolution. (Upham 1987, 22)

"*A strong state bureaucracy willing to intimidate or suppress rights assertion, institutional barriers that make using courts difficult, conservative judges and a hierarchical court structure that moderates judicial innovation, statutes that require conciliation and a 2000 year history, all shape the assertion and recognition of rights in Japan."* (Feldman 2000, 13)

The relationship between the bureaucracy and the courts, coupled with conservative ideals held by judges, significantly affects how litigants can assert their rights through the courts. The Japanese legal environment does not have the sense of "judicial activism" that is present in the US (in the 1990s this has changed somewhat in certain spheres). While US courts can establish or change social and political policies with their rulings, this can be done only to a limited extent in Japan. (Hayes 2001, 70)

Intellectual Property and Computer Software

Not only did the political notion of rights change over time, but the role of intellectual property in Japan did as well. After the Meiji Reformation, the role that intellectual property played in the Japanese economy changed, and it became perceived as serving national interests. Cognizant of the importance of the technology and knowledge that had been imported from the West would play in realizing the vision of a Japan that could stand equal to the West, the government took steps to establish an intellectual property regime that would facilitate the importation of IP. In establishing their own copyright and patents systems and joining the Berne and Paris Conventions,

Japan incorporated the Lockean and Kantian ideals found in the French, US and German systems they were modeled after. (Baughn et al. 1997, 60)

The Lockean right to private property ownership in Japan was further strengthened by the post-WWII Japanese constitution. Many parallels with the US Constitution exist, as can be seen in Articles 13 and 29:

> *Article 13. All of the people shall be respected as individuals. Their right to life, liberty, and the pursuit of happiness shall, to the extent that it does not interfere with the public welfare.*
>
> *(Japanese Constitution)*

Whereas the Jeffersonian language of "life, liberty and the pursuit of happiness" can be used to infer a right to private property ownership, Article 29 establishes this explicitly. Both articles clearly establish a Kantian balance of private rights to property ownership with the "public welfare." The extension of property ownership as an expression of individual liberty is weighed against the interests of the public. By similar reasoning, the Japanese government pursues the regulation of IP in a similar manner, favoring practices that favor public and national interests over the rights of individuals.

The Japanese Computer Software Industry

Cusumano contends that the Japanese software industry has developed under a set of conditions different that those found in the US. (Cusumano 1991, 52) The political, economic and technical circumstances under which the Japanese computer software industry has developed are significantly different from those found in the US. Understanding the relationships between a strong bureaucracy, state-led economic

policies and a divergent hardware market will provide significant insight to Japanese intellectual property reforms.

Taking the lead in implementing economic reform, the Japanese government has focused on national economic and social goals, rather than individual interests. During the post-WWII era (1946-1976), the state-led reforms led to a 55fold increase in the Japanese economy. (Johnson 1982, 6) However, the oil shock of 1973-1974 exposed Japan's "*vulnerability as a resource poor industrial nation.*" To combat this, the Japanese government initiated a plan for "joho-ka", or informationalization, within its economy.

MITI and other Japanese ministries, under the leadership of the Diet and the Prime Minister, started leading economic and IP reforms to transform Japan's resource intensive economy into an information economy. The Ministry of International Trade and Industry (MITI) subsequently established its "*vision of a 'knowledge-intensive industrial structure' in 1974*." (West 1995) The Japanese government has pushed reforms within its IP regime to achieve its long term strategic economic goal developing a domestic non-resource intensive industry. As part of the Japanese government's *joho-ka* initiative, IP policies were reforms and programs designed to cultivate the Japanese software industry were initiated.

Investments in the computer hardware industry during the 1970's and 80's had proved to be lucrative for the Japanese economy. Yet the computer hardware industry remained heavily dependent on the importation of raw materials for manufacturing and processing. The computer software industry offers no such liabilities, making it the next logical choice for the Japanese to develop. Despite pressure from the international community and the US, the Japanese government has preserved its own preferences for

balance between individual and public interests when implementing reforms to its IP laws to protect computer software.

While strengthening protections to software as IP and attempting to develop an internationally competitive software industry, the Japanese government had to cope with several significant obstacles. The most significant of these for the development of a robust and globally competitive Japanese software industry were the preference for customized software development, divergent computer hardware standards and the limited availability of Japanese versions of US software packages. A series of industrial development projects were initiated to address each of these obstacles. While these projects met with varying degrees of success, they underscored the commitment of the Japanese government to develop a domestic software industry.

In 1969, when IBM began marketing software separately from their computer hardware, several influential Japanese computer companies decided to sell IBM-compatible hardware. (Cusumano 1991, 27) Companies (such as Hitachi, Fujitsu and Amdahl) used competing and, often times, incompatible standards in order to establish a niche market for their systems. A split between IBM/PCs and those in Japan was caused primarily between different requirements for transforming language into binary code. The use of 256 character interface suited the English language fine, but was ill suited for accommodating the 7000+ characters found in Japanese. This fragmented the Japanese computer software industry and prevented the development of mass marketed software packages. (Uchikura 1994, 39)

The introduction of MS-DOS to the mass market in 1983 was no panacea for these hardware incompatibilities. Special modifications were required to be made to OSes

in order to make them run on the various divergent hardware platforms. Desiring market dominance through the adoption of their hardware standard, hardware manufacturers focused on acquiring a stable of custom tailored software applications, rather than agreeing to a universal hardware standard. By 1985, NEC had established itself as the dominant computer hardware manufacturer, with over 45% of the Japanese market. (Uchikura 1994, 39-40)

In 1986, Microsoft formed the Architecture Extended (AX) Consortium of Japanese hardware manufacturers with the purpose of adopting an IBM compatible standard, doing do garnered membership from many of the smaller Japanese computer makers. IBM Japan countered in 1989 by introducing DOS/V, a PC-DOS compatible operating system that incorporated Japanese character generation in the BIOS. This approach was well received by hardware manufacturers, siphoning many members from the AX Consortium. Despite these efforts towards standardization, NEC had increased its market share to 65%. Standardization by the private market was further undermined by the emergence of four competing versions of DOS/V: IBM PC-DOS, Toshiba DOS/V, Novell's Dr. DOS/V, and Compaq DOS/V. (Uchikura 1994, 40)

By 1990, the Japanese software market was 1/3 the size of the US market, yet remained fragmented. The competing hardware platforms created an environment that encouraged customized software development. At the time, roughly 80% of software sales in Japan were for customized, rather than pre-packaged. Comparatively, the US had benefited greatly by hardware standardization on the IBM/PC, where over 75% of software sales were for packaged software. (OTA 1992, 209) These numbers should be not be interpreted to infer that the Japanese software industry was inferior to that of the

US. In fact, software project surveys indicate that Japanese software products were superior to US software packages. (Cusumano 1991, 53)

Further hindering the development of a packaged software industry in Japan was the delayed availability of software created in the US. US software manufacturers were recalcitrant to provide support for multiple languages and hardware platforms outside their target customer group. From as early as 1969, this created in Japan what is described as a "software crisis." Coupled with increased personal computer use, this circumstance raised demand for software functionality soared beyond the supply capacity of Japanese software developers. Japanese software producers were often behind schedule, with final products that underperformed to user expectations and were riddled with bugs. (Cusumano 1991, 3-4) Japanese users had to wait months before a US application was translated and marketed for release in Japan. It wasn't until the 1990s that US companies began to realize the potential for the Japanese software market and started closing the delay between US and Japanese software releases. (Schneider 1994, 84)

It is under these political, economic and industrial circumstances that the Japanese government implemented programs to stimulate the domestic computer software industry. Overcoming incompatible hardware standards and an entrenched American software industry, reforms to intellectual property law were implemented that would favor domestic companies and attempt to make Japan a leading producer of computer software worldwide.

During the 1980's, several initiatives were established to overcome these obstacles. The 5th Generation project was a MITI initiative in 1982 to promote the

development of artificial intelligence, logic processing, and parallel computing. Receiving only weak support from the business sector, it was primarily a "*refinement of tools and technologies promoted in the US*" under which no apparent commercial applications were created. (Cusumano 1991, 389; 410-416) While failing to provide a direct return on investments, the project was successful insofar as it helped establish a common basic research infrastructure for computing in Japan. (OTA 1992, 208)

Announced in 1984, the commercial sector developed the TRON project, a standard architecture and OS for multi level use on a variety of platforms. A majority of the major Japanese computer companies joined the project, as did the US companies IBM and AT&T. While TRON is described as a technically superior OS, participating companies at the time were put off by the high costs of migrating applications developed for older systems. There was some speculation that TRON could be adapted to perform as an OS, however pressure from the office of the US Trade Representative dissuaded companies for pursuing that avenue. (Cusumano 1991, 396-397)

In 1985, MITI again attempted to develop a unified computer software industry in Japan by creating the SIGMA (Software Industrialized Generator and Maintenance Aids) project. Designed to foster software standardization around a UNIX based programming environment, the government and private industry cooperated in the Sigma project, attracting many major Japanese companies and subsidiaries, as well as US companies such as AT&T, IBM, and Sun. The "ultimate goal" of the Sigma project was to "*produce software through manufacturing instead of manual labor, moving the software industry from a labor-intensive to a knowledge intensive industry.*" Based on AT&T System V and BSD v 4.2, perceived problems over copyright ownership of software and tools

developed within the project eventually undermined its success. (Cusumano 1991, 398-403 / Siwek & Furchtgott-Rot 1993, 152)

While MITI sponsored software projects failed to meet their ultimate goals of establishing Japanese dominance in the global software market, they did a great deal to familiarize and train Japanese programmers to use a more standardized toolset. (West 1995) This has the effect of encouraging Japanese software manufacturers to use standardized development tools and practices that would operate on multiple platforms, reducing the costs and time of application development and opening up the American consumer software market.

Trade secret protection for computer software

While trade secrets are defined as "*a manufacturing method, market method or other technical or business information useful to commercial activity, which had been controlled as a secret has not been publicly known"*, there is no general rule against the "misappropriation" of information. The available laws are used primarily to protect companies against disloyal employees from selling secrets to competitors. However, strong ties of loyalty between employees and corporations create an environment of "corporate paternalism" that severely reduces the likelihood of needing such protections. (Kajarla 1990, 280) While there are protections for trade secrets, industrial espionage of foreign secrets is generally not viewed as a terrible thing.

Changes were made in 1990, with the enactment of the Japanese Trade Secret Law, establishing a system of protections for trade secrets similar to those in the US. Notable differences remained, such as the lack of a "discovery process" and the prohibition of sealing proceedings from public scrutiny. While litigation remains an

option, trade secrets discussed openly in court would be available to other competitors. (Hill 1995, 10 / Garroussi 1997)

Copyright protection for computer software

In 1983, three years after the US had implemented changes to its Copyright Law, two Japanese ministries made proposals for amending Japanese copyright law. The MOE and MITI engaged in regulatory competition for shaping new policy, (Kajarla 1990, 283) The contest between MITI and MOE was viewed as a "bureaucratic turf battle" for control over the emerging software industry. The MOE wanted to apply copyright protection to software, and was the logical regulatory entity it was the designated authority over copyrighted materials in Japan. The MOE's Copyright Reform proposal simply applied copyright protection for computer software, while MITI's Program Rights Law, was a *sui generis* approach to protecting software. This option differed substantially from the MOE proposal by imposing a 15 year limit on protection and included provisions for compulsory licensing. However, these two provisions are unenforceable, due to international obligations under the Berne Convention. It was these requirements that pushed the US to side with the MOE proposal. Further influencing the choice of viable policy options was the Berne Convention, which required a minimum of 50 years of protection for copyrighted material. (Kajarla 1990, 284)

With the acceptance of the MOE's proposal, several changes were made to the Japanese Copyright Law. Article 2(1)(xbis) was modified to define a computer program as "*an expression of combined instructions given to a computer...*" Article 10 (3) of the Copyright Law of Japan was amended to deny copyright protection for programming languages, algorithms or rules implemented software. (CRIC)

In 1986, the Japanese Diet addressed the particular problems posed by software under copyright law by designating jurisdictional responsibility for registration. Article 2 of the "Law on Exceptional Provisions for the Registration of Program Works" designates the Commissioner of the Agency for Cultural Affairs as the official position responsible for handling copyright registration of computer programs. Article 5 allows the Commission of the Agency for Cultural Affairs to designate a surrogate for registration of computer programs. Article 6 established standards of qualification to be designated as a surrogate registration authority. These include sufficient knowledge and skill, the financial and technical capacity to register program works and that the designee does not have a conflict of interest, and the designation "*does not hinder a proper and smooth conducting of registration*". (CRIC 2003) In designating the registration agency in law, the Diet prevented any interagency competition for authority over copyright regulation of computer software. The Software Information Center (SOFTIC), an NGO, was established in 1986 for the express purpose of registering computer programs and provide educational initiatives concerning copyright protection. (CIRC / SOFTIC)

The Japanese courts have chosen narrow interpretations of requirements for copyright protection, holding high standards for "creative expression" and "thought or sentiment." Additionally, whereas US courts had asserted that a program's SSO was copyrightable subject matter, the Tokyo High Court ruled in 1989 that SSO did not meet sufficiently creative criteria for copyright protection. (Hill 1995, 10) The courts have also have established a "merger doctrine" for software code, denying copyright for the most basic and efficient code sequences. (Ruping 1997)

The Agency for Cultural Affairs, operating within the MOE, is responsible for copyright within Japan. Under the "Law on Exceptional Provisions for the Registration of Program Works", it has selected SOFTIC with the powers to register copyright applications for computer programs in Japan. While SOFTIC serves as the registration body, the Association of Copyright for Computer Software (ACCS), a semi-governmental entity established in 1991, protects computer copyright owners through public education of copyright awareness. (CIRC)

In order to comply with international requirements for providing copyright protection for computer software MITI and the MOE presented competing proposals to the Diet. The competition between MITI and the MOE reflects not only the importance the importance of providing IP protection for computer software for Japan's economic development, but also the willingness of the government to explore several options before settling on the best course of action. It is also notable that it was the ministries, and not the judiciary, that pushed for IP policy reform.

Focusing on cultural and public interests, the Agency of Cultural Affairs uses educational initiatives and dispute arbitration to promote the emergence of the Japanese informational economy. The provision of copyright protection for software mimicked US policy and would be required under international treaty, but Japan only met with the minimum requirements. The endowment of SOFTIC with the specific responsibility of registering software programs and the narrow interpretation of the scope of copyright reflects a general preference for promoting Japanese software development over protecting the financial interests of individuals.

Patent protection for computer software

The patent system in Japan is tasked with ensuring that patents "*contribute to the development of industry.*" Article 2(1) of the Japanese Patent Law defines an invention as "*the highly advanced creation of technical ideas using natural laws.*" Article 29 further restricts patenting only to inventions that are useful in industry. (JPO)

Responding to increasing pressure to recognize software patents, the JPO investigated revising how it handled patenting computer software. In 1997, the JPO revised its "Implementing Guidelines for Examination Procedure of Computer Software-related Inventions." In Dec 2000, the JPO revised its "Examination Guidelines for Computer Software-related Inventions" to clarify how software could be patented under Japanese patent law. Computer programs were then considered "a product invention" when used in conjunction with hardware with "a statutory invention" to be protected by patents.

In Japan, MITI is responsible for industrial property in Japan, including patents. Under its supervision, the JPO specifically handles patent applications, including those for software related inventions. Focusing on competition rather than incentives as the mechanism for inducting innovation and creativity, low filing fees keeps the patent office flooded with applications for patents. (Kajarla 1990, 280) While this may seem overwhelming, only a fraction of those application are actually continued into examination.

To deal with some other difficulties posed by patenting software, an adequate prior art database needed to be constructed to aide the JPO during the examination process. With the revision of examination guidelines in 1997, the Computer Software

Database (CSDB) was created. The Software Patent Information Center (PIC) was created to operate the CSDB, and was annexed into SOFTIC.

In his analysis of the Japanese patent system, Kajarla concludes that "*Japan is likely to draw the line between innovation and imitation in unique ways. Even as the innovator is better protected… the economic usefulness of the imitator is not likely to be sacrificed in Japanese growth industry*. (Rushing/Brown 1992, ???) MITI, the JPO and the Japanese courts have placed the protection of individual's rights beneath the public good and national interest.

This preference for ensuring imitative innovation raises the patentability criteria for software. Software falls under the category of patentable subject matter by utilizing a "law of nature" only when it is used by the "*computer hardware… in a concrete manner*." (Takaura 2001, 1) This restrictive interpretation of requirements allows only a "*few software applications… [to] satisfy thee high level of novelty and inventiveness necessary to obtain a patent.*" (Ruping 1997) This narrow interpretation of patentable subject matter effectively provides patent protection for ideas embodied in software, yet allows software developers a great deal of leeway in imitating successful designs and interfaces. The latitude provided to software developers ensures that products would reach the market sooner, meeting the public interest of choice in the market and makes inventors more likely to recoup some of their investments.

Regime profile

Reforms to protect computer software have been part of a larger effort by the government to informationalize the Japanese economy. Software, as an information commodity that integrates closely with the Japanese computer hardware industry, is

targeted as a critical component of those efforts. Declaring economic reforms, Japanese ministries led a series of targeted reforms. Following a system of regulatory reform described as "strategic reinforcement", government ministries have led targeted and selective IP reforms as part of the "heroic task" of establishing the international dominance of the Japanese economy. (Vogel 1996, 12) Throughout this restructuring, government agencies have adapted their mechanisms of control and regulation over software, while promoting competition and protecting domestic industry. In 2000, as part of this restructuring, the number of ministries was reduced from 20 to 12. The Ministry of Education (MoE) has been incorporated into the Ministry of Education, Culture, Sports, Science, and Technology (MEXT). Similarly, the Ministry of International Trade and Industry (MITI) was transformed into the Ministry of Economy, Trade and Industry (METI).

The Prime Minister's Strategic Council on Intellectual Property (SCIP) and the Japanese Diet have coordinated the national initiative to recreate Japan as *"a nation built on intellectual property."* The SCIP has outlined its efforts to make Japan more competitive in the international community, for set national polities and passes laws. The Diet has recently reaffirmed the importance of IP for Japan's economy, passing the "Fundamentals of Intellectual Property Law" in 2002. (Nikkei Computer 2003, 1)

Historically, MITI and the MOE have been the ministries responsible for regulating patents and copyrights, respectively. While MITI and the MOE have competed for regulatory control over software, the role that SOFTIC plays in coordinating the copyright and patent protection for software between underscores the overriding

importance that the goal of developing the national economy has over individual ministerial initiatives.

Additionally, the recent consolidation of ministries in Japan will likely change the dynamic among government entities. The reduced number of ministries should contribute to greater communication, coordination and reduce incidents of bureaucratic turf battles between Ministries. Instead, confrontations are likely to continue within their respective ministry. The establishment of SOFTIC, as a non-government entity that serves both the Japanese Copyright Office and the JPO, further enhances the ability of the Japanese government to coordinate IP regulation under its regime.

The Japanese government has implemented IP reforms for computer software as a serious component of their Joho-ka initiative. In order to retain its internationally competitive technology sector, Japan has mimicked US reforms, hoping to achieve a similar level of success. (Vogel 1996, 36) Instead of implementing liberal protections, however, IP policy reforms have incorporated distinctly Japanese values and perspectives of balance between public and private interests. By utilizing narrow interpretations of IP ownership, the stronger copyright and patent protections have been afforded for computer software have been made to serve national and societal interests, rather than those of the individual.

Chapter Five: Regime Comparison

Japan and the US have both strengthened IP protection for computer software under trade secret, copyright and patent law. The each nation's regulatory reforms have exhibited significant differences perspectives on how packaged software should be protected and the scope and goals of those protections. While subject to normative influences from the international community, policy variations can be attributed to each nation's respective historical and economic circumstances.

Sector Comparison

Trade secrets

The TRIPS Agreement requires that signatory nations provide national protections for trade secrets. However, the extent to which the courts can be used as a mechanism to protect them differ greatly. Differing cultural and political valuations of secrecy have caused divergent perceptions as to where the line that defines a reasonable attempt to maintain secrecy lies.

The United States allows court proceedings to be sealed from the public. Japan, however, does not provide any such protection. The Japanese government maintains that the public right to access court documents, as embodied in its Constitution, supercedes an individual's claim of protecting trade secrets. This is a serious disincentive for cases involving trade secrets to reach litigation in a court of law. Japan's constitution makes all court cases open to the public, inhibiting the ability of a company to maintain secrecy while litigating.

Trade secret protections offer only a limited scope of protection for computer software. Primarily limited to contractual violations, trade secrets can protect the large amounts of time and resources that software developers invest in the development of their products. Within the US, heavy penalties for trade secret violations are intended to protect against unscrupulous employees and industrial espionage.

In Japan however, the corporate environment significantly diminishes the utility of such protections against employees. Instead, it has chosen to prioritize the rights of citizens to a transparent government Additionally, the loss of trade secret protections if legal recourse is sought generally benefits the domestic industry by creating a disincentive for external players to rely on using confrontational litigation to protect trade secret investments.

Copyrights

As the internationally accepted standards for protecting computer software, the US and Japan IP regimes have both reformed their copyright systems to provide such protections. Yet there are distinct differences as to the method and scope that each regime applies in copyrighting software.

The courts in each country have had a good deal of influence in determining the scope of protection that copyright applies to software. Both nations acknowledge the importance that accepted standards for software interfaces has in the promotion of the software industry. While the US courts have expanded copyright over software to include the SSO of a program, the Japanese courts have set higher standards for copyright. Choosing a narrow scope of claims, the Japanese courts have denied the protection for SSO and essential functions, protecting domestic software developers. (Ruping 1997)

Software piracy, and the enforcement of copyrights, has been a concern in both nations. In the US, the courts have imposed hefty fines for on software piracy, while Japan has chosen to address its "cultural ambiguity of ownership" of software through educational programs. (Hill 1995) Instead of focusing on litigation as the primary mechanism for protecting copyright on software, Japan tends to follow other guidelines. Education of the public through semi-government or industry groups is preferred. (Hill 1995)

The differences between regulatory styles and goals between the US and Japan are further exhibited in the organizational changes to copyright systems in order to accommodate registration for software programs. The US Copyright Office has implemented special guidelines for the deposit requirements regarding software. Japan, on the other hand, has created a special organization (SOFTIC) for the express purpose of handling the registration of software copyrights.

Patents

The protection of computer software under patent law has been particularly contentious for Japan and the US. Between the two patent systems, 90% of the world's software patents are acquired. The US retains the lion's share (60%) and Japan, the remaining 30%. (Aharonian 2002, 5) Each nation has responded differently to recognizing of software patents. The differences in the US and Japanese patent system reforms are *" simply a reflection of different estimates concerning where the protective line should be drawn to maximize overall social return.*" (Kajarla 1990, 285-286)

The primary differences between the regulatory approaches between the two nations have been the perceived purposes of patents in the national economy. "*[T]he US*

regards patents as one's property, whereas Japan tends to regard it as a public good." (Katobe 1992, p164)

Combined with a predisposition for judicial contestation of regulatory authority, the US courts have chosen to vigorously pursue the protection of the rights of inventors. This has forced the PTO to change its examination policies for software patents. The courts even maintain regulatory oversight of the patent examination process, reserving the right to overrule the decisions of patent examiners. Fearful that an underfunded examination process would exert adverse effects upon the software industry, the private market has organized a prior art database of software to make available to the USPTO.

Japan, on the other hand, has placed the focus of the patent system on the promotion of industries and the national economy, by subordinating "*the short-term interests of the innovator… to the broader policy goals of diffusion of technology."* (Ordover 1991, 48) The patent examination guidelines in Japan were revised after having learned from the examples of the US. Additionally, a prior-art database was established and placed under the supervision of SOFTIC. This creates a mechanism of coordinated IP protection for software in Japan that is not available in the US.

Regime Comparison

While both Japan and the US regulate IP for the purposes of the economic prosperity, the balance between public and individual interests maintained by national IP regimes differ. The US IP regime fosters individualism, believing that benefits provided to individuals will translate to benefits for society as a whole. Japan, on the other hand, places a heavier emphasis on the welfare of the collective, rather than the individual. (Garroussi 1997, 2)

Table 3: Patterns of regulatory reform

	US	Japan
organization	Fragmented	coordinated
orientation	Liberal	managerial
pattern of reform	Juridical	strategic
goals of reform	individual interests	industrial goals

(adapted from Vogel 1996, 208)

IP reforms in the US have been motivated primarily by the judicial system. "*[A]lready quite liberal, legalistic, and decentralized prior to the deregulation movement that began in the min-1970s*," the protection of individual rights drove IP reforms through the courts within the US. (Vogel 1996, 218-219) The US private sector "*aggressively challenged the regulatory system*" through a "*highly codified and legalistic regulatory regime*", whose liberal tendencies tended to disadvantage regulators. This "*adversarial system of regulation*" is viewed by actors in the public and private sectors as normal and acceptable behavior. (Vogel 1996, 230)

As part of its *joho-ka* initiative to revitalize Japan's economy, the Japanese government has implemented a coordinated system of reforms to protect computer software. The Japanese IP regime places greater reliance on negotiation and compromise rather than litigation to settle disputes. Due in part to a different legal culture than in the US, the government disdain for litigation as a mechanism for conflict resolution has reduced the influence of the courts in forcing reforms. (Clapes 1993, 173) This has allowed the Japanese government to develop an IP regime consistent with its cultural and political values to achieve national goals.

Despite normative influences from international obligations, the US and Japan exhibit significant variations in policy reforms for intellectual property regimes with respect to computer software. The liberal reforms within the United States intellectual property regime would be consistent with ideologies focusing on individual rights, as well as a reliance on market mechanisms to efficiently adjust to regulations. Regulatory agencies have been forced to adapt to the extension of liberal rights by the judicial system.

Japan has instituted similar reforms to those of the United States, as required by international treaties, but in a manner consistent with past IP practices. Japan enhanced government regulatory power through careful state-led reforms, maintaining a focus on national economic goals, rather than individual rights. This difference in policy is due in part to a different interpretation of "rights" in the Japanese political system and a diminished ability of the judiciary to effect social change.

The variation in US and Japanese IP reforms for the protection of computer software are associated with different concepts of "rights" within each nation, the historic development of its respective computer industry, and the relationships that state regulators have with private sector actors. Despite normative international pressures, the unique perspectives that each nation has in these areas has affected policy reforms within each nation's respective IP regime. From this thesis, one can expect the reforms that a nation makes to its IP regime to protect computer software will be based upon that nation's historical perspective of individual political rights, the past development of its

computer software industry and the relationships that state actors have with the private sector.

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